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A comparison of modes of communication between members of a string quartet and a jazz sextet

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ABSTRACT
This study revealed the modes of communication employed between the members of a professional string quartet during rehearsal and performance. Results of this study enabled comparison with modes of communication employed by a student jazz sextet revealed in a previous study by the first author. Six modes of communication were revealed in both studies (i.e., verbal and non-verbal, instruction/cooperation/collaboration). Results indicated that the modes of communication employed by both groups of musicians (i.e., the string quartet and the jazz sextet) were the same, although, at times, the content of the communication differed based on the presence of a pre-composed score and conventions of the musical genre. Participants in both studies confirmed researcher interpretations of the modes of communication during member checks. Results also indicated that when playing from a pre-composed score the string quartet were able to become empathetically attuned and produce ‘spontaneous musical variations’ during performance. The authors propose that these spontaneous musical variations are examples of ‘empathetic creativity’.

KEYWORDS: collaboration, cooperation, empathy, instruction, performance

Introduction
When comparing two small performing groups of musicians, such as a string quartet and a jazz sextet, one might assume the different instruments and genres involved would reveal vast differences between these two groups of musicians. For example, the string quartet would presumably strive to play an accurate version of a pre-composed piece from a written score and the jazz group would strive to play interesting improvisations based on a pre-composed piece. The string quartet’s piece would be written as a precise musical score and would provide each player with a complete instrumental part. The jazz group’s piece may be aurally transmitted or taken from a ‘real’ or ‘fake’ book that provides only a guideline melody and chord sequence of the piece. However, there are also many similarities between these two contrasting musical groups. For example, they both strive to create ‘novel musical performances’ every time they perform (Murnighan & Conlon, 1991; Sawyer, 2006).
Also, the musicians in both groups must communicate with each other during rehearsal and performance to achieve these novel musical performances (Sawyer, 2005). This article focuses on musical communication, i.e., ‘the interactional dynamics of the group’ (Sawyer, 2005, p. 49) when rehearsing and performing pre-composed pieces. It reports on an investigative study that revealed the moment-by-moment verbal and non-verbal communications between the members of a string quartet during rehearsal and performance and compared them to those employed by a jazz sextet revealed in a previous study (Seddon, 2005). The notion of what constitutes a novel musical performance when adhering to a musical score is also explored.

**Overview**

During the last three decades, the string quartet has been the focus of attention for researchers examining musical and social collaboration between musicians (Blum, 1986; Butterworth, 1990; Davidson & Good, 2002; King, 2006; Murnighan & Conlon, 1991; Rounds, 1999; Tovstiga, Odenthal, & Goerner, 2005; Young & Coleman, 1979). These researchers have approached their investigations from a variety of perspectives. The majority of this research, employing a variety of research strategies, has examined the roles adopted by the members of the string quartet. Young and Coleman (1979) were the first to consider the relevance of psychological research into group dynamics for investigating leadership issues within a string quartet. This was, however, a theoretical paper that the authors recognized as speculative and requiring substantiation through further empirical research. Butterworth (1990) provided some support for the group processes outlined by Young and Coleman (1979) through a case study that involved observation, questionnaire and interview procedures with the members of the Detroit String Quartet. This case study provided an analysis of leadership roles, member interactions, group aspirations, personalities and conflict but, as a case study, only offered evidence from a single perspective. Blum (1986) and Rounds (1999) adopted a biographical approach to exploring the group processes in string quartets, but both authors acknowledge the potential validity problems of biographical reporting.

The first large-scale empirical investigation into the internal dynamics and success in string quartets was undertaken in 1991 (Murnighan & Conlon, 1991). This study involved 20 British string quartets and employed semi-structured interviews, archival analysis and observation techniques in a mixed inductive–deductive approach to the relationship between intra-group interaction and success. Results focused on the identification of three paradoxes important to the functioning of string quartets. Murnighan and Conlon named these three paradoxes: ‘leadership versus democracy’, ‘the paradox of the second fiddle’ and ‘confrontation versus compromise’ (Murnighan & Conlon, 1991). The authors argued that paradoxes are inherent in social groups generally, and in successful string quartets these paradoxes are acknowledged and not confronted, but accepted and managed implicitly. The research revealed that members of successful string quartets resolved conflict through non-verbal rather than verbal communication.
Davidson and Good (2002) employed video recordings and semi-structured interviews in a study of a student string quartet examining social and musical coordination between the musicians as they prepared for their first recital. Results from this study included an examination of the issues raised in Murnighan and Conlon (1991) focusing on the roles adopted by each of the musicians and how the second violinist, and only male member of the quartet, interacted with the other three female members of the string quartet. This second violinist often criticized the first violinist on her ability to keep time, yet all three women allowed the male, second violinist ‘musical space’ to allow for his weaknesses as a player. This meant that the second violinist was criticizing something that he was partly the cause of (Davidson & Good, 2002). Davidson and Good (2002) concluded that the musical work was not only a product of socio-cultural factors, it was also influenced by the interpersonal dynamics of the musicians during rehearsal and performance. They also argued that the audience’s perception of the work could be influenced by the interpersonal dynamics of the musicians. Furthermore, the musicians could subsequently be influenced by the audience’s reactions to their performance, thus creating a constant interaction between musicians and audience impacting on how the performance unfurled (Davidson and Good, 2002).

Later research returned to the examination of leadership issues in string quartets. Tovstiga et al. (2005) in a case study conducted with the Carmina String Quartet also focused on the flexibility of leadership roles and how the style of leadership impacts on the success of the group. King (2006) also examined through observation and interview the roles adopted in three student quartets, one of which was a string quartet. King reported on the impact of regular leadership in student quartets and the roles adopted by the other members of the quartets. With the exception of Davidson and Good (2002), none of the previous studies of string quartets examined in any detail musical coordination during rehearsal and performance.

Davidson and Good (2002) applied a two-tier approach to the analysis of their data investigating socio-cultural issues and moment-by-moment social and musical coordination. However, the authors acknowledged that the student string quartet involved in their study had only been playing together for a period of six months. This meant that much of their musical coordination focused on exchanges relating to technical and individual concerns rather than matters of musical meaning (Davidson & Good, 2002). According to the authors, this focus on technical and individual concerns probably resulted from the student string quartet’s limited experience of working together, which prevented them accessing certain socio-cultural features of performance, for example, ‘mutual tuning-in relationship’ (Schutz, 1964). These socio-cultural features emerge as individuals in ensembles develop an understanding of each other, and learn what to expect from each other and how to meet each other’s expectations (Davidson & Good, 2002). Some anecdotal sources cite jazz musicians speaking in interviews of instant musical connections they have formed with other musicians (Berliner, 1994). However, these jazz musicians are often very experienced group performers and this experience probably contributes to any instant musical connections. When reporting on the coordination of process Davidson and Good (2002) provided evidence of non-verbal communication (e.g., eye contact and gesture) as did Williamson and Davidson (2000) in their reporting.
of co-performer communication. However, when musicians play together in small groups (e.g., string quartets and jazz groups) they have at their disposal a unique form of communication (i.e., musical communication). In jazz groups, this musical communication can be regarded as an ‘interplay of stocks of musical knowledge’ and ‘spontaneous musical utterances’ (Davidson & Good, 2002). For example, musicians describe how they listen to recordings they have made and hear themselves playing phrases they have never previously practised but that have emerged as a result of what other musicians were playing at the time. These unpractised phrases may be regarded as ‘spontaneous musical utterances’ (Seddon, 2005). ‘Spontaneous musical utterances’ can emerge from the ‘interplay of stocks of musical knowledge’ when musicians are ‘empathetically attuned’ (Seddon, 2005), in a ‘group flow’ state (Sawyer, 2006) or ‘striking a groove’ together (Berliner, 1994, 1997; Kenny & Gellrich, 2002; Monson, 1996). In order to investigate the communication that takes place between small groups of musicians during rehearsal and performance it is necessary to observe their activities and to have a method of analysis available to interpret their behaviours. Furthermore, a method of supporting or validating these interpretations is also required.

A methodology for the investigation of modes of communication between members of a student jazz sextet was established in a previous study (Seddon, 2005). This study explored the notion of ‘empathetic creativity’. Seddon reported that empathetically creative musicians were sensitive to ‘attunement’ in order to signal attention and ‘mirroring’ to affirm and modulate musical responses. He argued that empathetic attunement requires more than individual self-absorption in playing: it requires communication and collaborative aesthetic judgment. Seddon proposed that attunement can occur at both a sympathetic and an empathetic level. At a sympathetic level of attunement musicians focus on achieving a cohesive performance, but elements such as clashes of musical styles, interpretations of rhythms or accommodation of a weaker player can prevent musicians developing towards an empathetic level of attunement. Empathetic attunement occurs only when musicians are able to decentre and see things from others’ musical perspectives. During decentring, players are not only concerned with their collective time-keeping role, they also strive to achieve a collective transparency of sound where each part is discernible. Seddon proposed that empathetic attunement was a necessary prerequisite for the emergence of ‘spontaneous musical utterances’ that may be regarded as examples of ‘empathetic creativity’. In one sense, ‘empathetic attunement’ can be considered synonymous with ‘group flow’ and ‘striking a groove’, as they all describe a collective state of mind during which spontaneous musical utterances can emerge. We might consider setting empathetic attunement within a theoretical framework drawn from Arnold’s research on empathetic intelligence (Arnold, 2004), which provides criteria for distinguishing between sympathetic and empathetic attunement based on the ability to decentre. Her research also begins to provide an account of the psychological processes required to reach this desired state. If this theoretical account can be verified through research, it could be applied in a teaching situation to help student musicians achieve these desired states earlier in their musical careers (Seddon, 2004, 2005).
When making a comparison between small groups of musicians from different genres, such as jazz and classical music, it could be argued that adherence to a musical score may limit the opportunity for spontaneous musical utterances in groups of classical musicians. However, similar forms of spontaneous performance can occur between small groups of classical musicians (Davidson & Good, 2002; Murnighan & Conlon, 1991; Palmer, 1997; Sawyer, 2006; Williamon & Davidson, 2002). Because jazz musicians improvise, they can produce ‘spontaneous musical utterances’ (i.e., the pitch of the notes can be varied). Classical musicians must remain faithful to the notes written in the score but may still produce ‘spontaneous musical variations’ based on varying interpretations. For classical musicians, rehearsal may provide the opportunity to learn the score, and establish cohesion and expressive features of the music, but performance offers the opportunity for spontaneous variations, as the following passages reveal:

even after considerable rehearsal, members can surprise each other or their audience with spontaneous flourishes. Quartet players feed off each other, as one cellist put it trying to achieve ‘a spiritual experience, ... which is the ultimate one can hope for’. (Murnighan & Conlon, 1991)

And there is no difference in principle between the performance of a string quartet and the improvisations at a jam session of accomplished jazz players. (Schutz, 1964, p. 177, quoted in Sawyer, 2006, p. 160)

The current study builds on the previous studies reviewed above. It adopts many of the methodological approaches and also addresses some of the concerns raised by the previous authors when indicating possible directions for further research. For example, the current study is conducted with a more experienced, professional string quartet to allow for the emergence of musical meaning in the data. Because, according to Davidson and Good (2002) their student string quartet’s lack of experience limited their discussion of musical meaning. It is also proposed that, as more experienced professional players, the familiarity among the musicians will allow for a deeper level of interaction based on their shared social and musical experiences (Berliner, 1994, 1997; Murnighan & Conlon, 1991; Seddon, 2005).

**Aim of the study**

The current study focuses on the moment-by-moment verbal and non-verbal communication that takes place between the musicians in the string quartet and goes on to compare their communication processes with those employed by the jazz sextet in a previous study (Seddon, 2005). It also examines the role this communication plays during rehearsal in shaping the eventual performance.

Although exploratory in nature, the following general research questions were addressed.

1. What are the communication processes employed between members of this string quartet during rehearsal and performance?
2. How do these modes of communication differ from those employed by a student jazz sextet?
3. Does adherence to a musical score prevent the emergence of novel musical performances?

**Method**

**Participants**
The Paul Klee String Quartet is an international, professional string quartet based in Venice, Italy (see Quartetto Paul Klee, n.d.). The quartet was formed in 1990 and since formation there have been two changes in personnel. The current second violinist and cellist were recruited in 2002 since which there have been no further changes. The quartet is unusual in that it adopts the German seating position (i.e., from left to right, 1st violin, viola, cello and 2nd violin) rather than the conventional seating position (i.e., from left to right, 1st violin, 2nd violin, viola, and cello). All the players are male: Alessandro Fagiuoli (1st violin), Stefano Antonello (2nd violin), Andrea Amendola (viola), Luca Paccagnella (cello). The average age of the musicians is 43 years. All the players graduated from Italian conservatories of music and studied in postgraduate master classes in various parts of the world. Currently, all the players are also involved with instrumental tuition and/or teaching chamber music at conservatory level. The quartet perform internationally in prestigious venues such as the Grande Teatro, La Fenice in Venice and other important international venues in the major cities of Ireland, Spain, Portugal, Turkey and the USA (including New York). Their performances have been featured in radio broadcasts and their discography includes recordings of pieces ranging from baroque to contemporary music. The quartet has had a number of pieces composed specifically for them.

**Procedure**
The musicians invited researchers to videotape three rehearsals prior to the concert, a pre-concert rehearsal (this took place immediately before the performance) and the concert performance. The rehearsals followed the usual pattern of rehearsal employed by this string quartet when preparing for a concert. The concert was performed on 29 May 2005 at the Sala dei Giganti al Liviano in Padova. The programme consisted of:

- J.S. Bach, Contrapunctus 1, 2 and 3, *Da ‘L’ Arte della Fuga’, BWV 1080*
- Philip Glass, String Quartet no. 2 ‘Company’ Movements I, II, III and IV
- Philip Glass, String Quartet no. 4 ‘Buczak’ Movements I, II and III
- J.S. Bach, Contrapunctus 4 and 6, *Da ‘L’ Arte della Fuga’, BWV 1080*

Memorization of the music was not specifically employed. However, all the Bach pieces and the Glass no. 2 had been performed at previous concerts so were well known to the musicians. This meant that the Bach pieces and the Glass no. 2 required less reference to the score during rehearsal and performance than the Glass no. 4 which was the only piece they learned specifically for this concert.
DATA
The videotape data was recorded at all four rehearsals and the concert and consisted of: Rehearsal 1 (50 minutes), Rehearsal 2 (75 minutes), Rehearsal 3 (117 minutes), Pre-concert Rehearsal (33 minutes) and Concert (60 minutes).

ANALYSIS
The procedures employed for analysing the video data collected during the rehearsals and concert were informed by the sequence of procedures employed in previous studies (Davidson & Good, 2002; King, 2006; Seddon, 2005). The qualitative analysis procedures employed in the current study allowed the modes of communication to emerge from the data and facilitated the comparison of these modes of communication with those revealed in the previous jazz study (Seddon, 2005). This combination of procedures resulted in a six-stage analysis process described below:

1. The two authors (both music psychologists and trained musicians) together observed all the videotaped material once through to establish the nature of the material.
2. All rehearsal videotapes were transcribed documenting the verbal discourse between the participants during rehearsal and the transcripts were subjected to a thematic analysis. This thematic analysis was based on ‘grounded theory’ (Glaser & Strauss, 1967) and employed the ‘constant comparative method’, which allowed the verbal categories to emerge from the data through a process of inductive reasoning (Glaser & Strauss, 1967; Lincoln & Guba, 1985). Constant comparative method involves a five-stage process: (1) immersion, (2) categorization, (3) phenomenological reduction, (4) triangulation and (5) interpretation (McLeod, 1994).

- Immersion involved repeated viewing of the transcribed verbal material to acquire a high level of familiarity with the raw data.
- Categorization involved the identification and categorization of verbal ‘units of analysis’ that emerged from the data (e.g., instructions, discussion of organization, technique, interpretation, dynamics, bowing, tempo, and phrasing).
- Phenomenological reduction involved grouping these verbal ‘units of analysis’ into ‘themes’ according to a ‘rule of inclusion’ which was constructed through a ‘propositional statement’ grounded in the verbal ‘units of analysis’ already assigned to the categories. Each verbal ‘unit of analysis’ had to comply with the ‘rule of inclusion’ for a ‘theme’ to be included in that ‘theme’. When a verbal ‘unit of analysis’ did not comply with the ‘rule of inclusion’ for existing ‘themes’, a new ‘theme’ was created with its own ‘rule of inclusion’ defined by a new ‘propositional statement’. Three verbal communication themes emerged during this process which at this stage were labelled (a), (b) and (c):
  - Theme (a): This verbal communication was characterized by the musicians being instructed by other musicians on any aspect of playing.
  - Theme (b): This verbal communication was characterized by the musicians discussing the organization of the music or technical
problems that arose during rehearsal (e.g., bowing when related to technical issues, whether or not to observe repeat signs).

- Theme (c): This verbal communication was characterized by the musicians discussing issues of interpretation and the creative development of the piece (e.g., phrasing, dynamics, tempo and bowing when related to interpretation).

- Triangulation of these verbal communications was addressed concurrently with the non-verbal communications through the process known as ‘member checks’, where examples of verbal and non-verbal communication and researcher interpretations of these communications were presented to the participants for their comments (Brown & Gilligan, 1992; Lincoln & Guba, 1985; Punch, 1998; Seddon, 2005).

3. Rehearsal and performance videotapes were repeatedly viewed to allow categories of non-verbal communication to emerge from the raw data. The analysis of the non-verbal communication followed the procedures employed in the analysis of the verbal communication described above. The process was an adaptation of the constant comparative method for use with non-verbal communication first employed in a previous study investigating composition strategies (Seddon & O’Neill, 2003) and subsequently in the previous jazz study (Seddon, 2005):

- Immersion involved repeated viewing of the videotaped material to acquire a high level of familiarity with the raw data.
- Categorization involved the identification and categorization of non-verbal units of analysis that emerged from the data (e.g., aural demonstration, body language, facial expression, eye contact, gesticulations and musical cues). Phenomenological reduction repeated the process described for the non-verbal communication. Three verbal communication themes emerged during this process which at this stage were labelled (d), (e) and (f):

  - Theme (d): This non-verbal communication was characterized by a musician(s) being instructed by another musician(s) through aural demonstration, or the musical score, on how to play something in the music.
  - Theme (e): This non-verbal communication was characterized by the musicians playing cohesively when ‘sympathetically attuned’. ‘Sympathetic attunement’ was exemplified by a lack of ‘risk taking’ and ‘challenge’ to individual or collective creativity. Sympathetic attunement was visually evident through a lack of physical expressions of engagement with the music (e.g., no smiles, no affirmative nods or ‘positive’ energetic body movements) and musically evident through comparatively predictable performance that ensured musical cohesion without creative risk through adhering to previously rehearsed interpretations.
  - Theme (f): This non-verbal communication was characterized by the musicians playing more animatedly when ‘empathetically attuned’. ‘Empathetic attunement’ is visually evident through physical expressions of engagement with the music (e.g., smiles, collective affirmative nods and positive energetic body movements) and musically evident through comparatively less predictable performance that facilitated
collective creative risk taking that resulted in challenging previously rehearsed interpretations that at times resulted in a ‘spontaneous musical variation’. A ‘spontaneous musical variation’ was produced when the musicians were ‘empathetically attuned’ providing an example of ‘empathetic creativity’.

4. Discussions between both researchers regarding the interpretation of the themes (a)–(f) revealed an agreement that the verbal and non-verbal modes of communication emerging from the current study were the same as those established in a previous study undertaken with student jazz musicians (Seddon, 2005). The themes in the current study were subsequently interpreted as verbal: instruction, cooperation, collaboration; and non-verbal: instruction, cooperation, collaboration.

5. Together, both authors revisited the raw data to ensure that all communications between the members of the string quartet were attributed to the modes of communication established in the current study.

6. Validation of the researcher interpretations of the verbal and non-verbal modes of communication in the current study was sought through a process of ‘member checks’ with the participants (Brown & Gilligan, 1992; Lincoln & Guba, 1985; Punch, 1998; Seddon, 2005).

Results

Hoogsteder, Maier and Elbers (1998) in a study investigating interaction during joint problem solving, describe a ‘mode’ of interaction as a communicative interaction that provides a framework that gives meaning to the participants’ activities. As each of the six types of communication both verbal and non-verbal displayed by the participants in the current study was linked to a particular activity (i.e., instruction, cooperation and collaboration) the different types of communication were interpreted as ‘modes’ of communication. Analysis of the videotaped rehearsals and performance revealed six modes of communication between the members of the string quartet that were directly related to musical aspects of rehearsal and performance. These modes of communication formed two main categories, verbal and non-verbal, each containing three distinct modes of communication that were subsequently interpreted as instruction, cooperation and collaboration (see Table 1). Two of the modes of communication, i.e., cooperative (verbal and non-verbal) were revealed to be related to activities facilitating cohesive performance of the music. Another two of the modes, i.e., collaborative (verbal and non-verbal) were revealed to be related to activities facilitating creative developments in the interpretation of the music. The modes of communication related to cohesive performance were interpreted as being of a lower order than those related to interpretation of the music. Underwood and Underwood (1999) support this interpretation of the modes as hierarchically distinct as they make a hierarchical distinction between ‘cooperative’ modes and ‘collaborative’ modes. Generally speaking, cooperative modes are associated with lower-level cohesive processes and collaborative modes are associated with higher-level creative processes. A further hierarchical distinction was made between modes of communication in relation to levels of attunement between the participants. Sympathetic attunement was regarded as a lower order level of attunement than
empathetic attunement (Arnold, 2004; Seddon, 2005). Evaluation of the performances produced was based upon researcher judgments of the production of ‘spontaneous musical variations’ that are examples of ‘empathetic creativity’ as distinct from ‘adherence to stylistic convention’ (Seddon, 2005). Although it was possible to identify six distinctly different modes of communication, the musicians seldom used these modes separately, they often employed them simultaneously. For example, the musicians often illustrated verbal instruction, cooperation and collaboration with their non-verbal counterparts. These non-verbal illustrations remain in the verbal examples below in order to remain faithful to the original verbal transcripts, but during analysis the non-verbal illustrations would be regarded separately as non-verbal modes of communication.

**EXAMPLES OF THE MODES OF COMMUNICATION**

**Verbal Modes**

**Verbal instruction**  A verbal communication was interpreted as *instructional* when a member of the group gave another member specific verbal instructions on when to start playing, members verified notes in the score with each other or instructed each other how a section of the piece should be performed. These communications did not require any discussion. For example:

- Verbal Instruction 1: The 1st Violinist clearly instructs the other members of the quartet to begin playing at bar 22 from the second time bar:

  1st Violinist: Let’s go from bar 22 the second time.

### Table 1  Modes of communication

<table>
<thead>
<tr>
<th>Mode of communication</th>
<th>Verbal</th>
<th>Non-verbal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instruction</td>
<td>Musicians are instructed when to start playing. Notes in the score are verified and instruction on how to play certain sections of the piece is given.</td>
<td>Musicians are instructed through music notation or aural demonstration.</td>
</tr>
<tr>
<td>Cooperation</td>
<td>Musicians discuss and plan the organization of the piece in order to achieve a cohesive performance and address technical issues (e.g., bowing).</td>
<td>Musicians achieve ‘sympathetic attunement’ producing a cohesive performance employing: body language, facial expression, eye contact, musical cues and gesticulation.</td>
</tr>
<tr>
<td>Collaboration</td>
<td>Musicians collaborate to evaluate performance and discuss remedial action if required in the music in order to develop interpretation and/or style of the piece.</td>
<td>Musicians achieve ‘empathetic attunement’, take creative risks that can result in spontaneous musical variations. When they do, this signals ‘empathetic creativity’.</td>
</tr>
</tbody>
</table>
Verbal Instruction 2: The Violist and 1st Violinist ask the Cellist for verification of the key at a certain point in the score.

Cellist: Bar 32?
Violist: Is it minor?
Cellist: I have A flat major [singing a fragment] and then D major [singing a fragment].
1st Violinist: Is it correct?
Cellist: A flat major Bar 33, 34.

Verbal Instruction 3: The Cellist instructs the Violist to play a section without crescendo.

Cellist: You try it without the crescendo, like ... even.

Verbal instruction emerged mainly when the group were beginning rehearsal of a piece and provided an appropriate, non-democratic mode of communication for initiating performance.

Verbal cooperation A verbal communication was interpreted as cooperative when discussion between the musicians regarding possible organizational or technical changes (e.g., repeats or bowing) took place in a democratic way. These organizational changes to the piece were agreed to enable the musicians to cooperate in order to achieve a cohesive performance by agreeing the basic form and technical aspects of the piece beforehand. For example: A discussion regarding the bowing of a certain section of the piece takes place between the 2nd Violinist and the Violist.

2nd Violinist: Yes, if we don’t stress this one; it works.
Violist: Excuse me Stefano, I don’t remember, at bar 9, don’t you have maybe ...? I mean, I do [sings his part] ... at that point the bowing is correct, only at the end?
2nd Violinist: The only thing is that this hasn’t to be stressed too much ... [sings what he (the Violist) should play].

Verbal cooperation emerged each time musical communication was suspended. It provided a verbal medium for the musicians to clarify, evaluate and adapt organizational issues or technical problems that did not directly involve creative issues (e.g., bowing, whether or not to observe repeated sections).

Verbal collaboration A verbal communication was interpreted as collaborative when discussion regarding possible creative changes took place in a democratic way. During verbal collaboration, changes in interpretation were discussed, developed and implemented following group evaluation of both the piece and the musicians’ individual and combined performances. For example, an evaluation of a section of the piece is made and discussion regarding the interpretation takes place:

Take care that it is not too much at bar 17 [singing demonstration] but I’m not sure of that. (Violist)
As you were saying before, playing the downward slurs? Perhaps it is true? I exaggerated. (Violist)
Usually, when it is a bridge passage it is better, if you slur downwards, after you can do whatever you want. It could happen in many places of the piece, it is never regular but it is a change of accent and you must not change it. (Cellist)
Verbal collaboration also emerged when musical communication was suspended. It involved the verbal expression of the musicians’ creative preferences (e.g., issues of interpretation such as phrasing, dynamics and tempo), which gave a sense of the creative development of the piece belonging to the group rather than the individual.

Non-verbal Modes

Non-verbal instruction A non-verbal communication was interpreted as instructional when (1) the musicians focused on reading the music notation to the extent that it could be argued that the notation was instructing them on what to play, and (2) when there was a musical dialogue consisting mainly of one or more of the musicians demonstrating for another how a particular section of the piece should sound by playing it on an instrument or vocalizing it. For example:

- Non-verbal Instruction 1: The members of the quartet were observed focusing intently on reading the notation. Essentially, in this mode of communication, often found in the early stages of rehearsing a new piece, the notation instructs the musicians’ playing.
- Non-verbal Instruction 2: The 1st Violinist and Cellist provided an aural demonstration to the Violist demonstrating how his part should be played.

Non-verbal cooperation A non-verbal communication was interpreted as cooperative when the musicians became sympathetically attuned, displaying non-verbal communication (e.g., body language, facial expression, eye contact, musical cues and gesticulations). This mode of communication facilitated a cohesive performance and at times contained sympathetically attuned musical cues that focused on cohesive issues (e.g., staying in time and generally playing together). When cohesive performance became problematic playing would cease and verbal communication would address these problems. Depending upon the nature of the problem, this would involve either verbal cooperation or verbal collaboration.

Non-verbal collaboration A non-verbal communication was interpreted as collaborative when communication was conveyed directly through musical interaction and focused on creative exchanges. This non-verbal collaborative form of interactive, creative musical communication required empathetic attunement between the musicians to occur. In this mode of communication, the music itself acts to communicate along with body language that tends to be more exaggerated, expressing enjoyment and positive evaluation of their combined playing. When this phenomenon occurs it provides the vehicle for empathetic creativity to emerge which, when it does, is exemplified by spontaneous musical variations.

Sympathetic and empathetic attunement

Researcher judgments of sympathetic vs. empathetic attunement were made based upon comparisons of observed participant communication, both visual and musical, produced during videotaped observation sessions. When sympathetically attuned, the musicians were perceived to be drawing on their musical knowledge base, playing without taking risks or challenging their individual or collective creativity. Sympathetic attunement was visually evident in expressions of relative disinterest
(e.g., no smiles, affirmative nods or energetic body movements). Sympathetic attunement was musically evident in comparatively predictable performance providing musical cohesion without creative risk through adhering to previously rehearsed interpretations.

When empathetically attuned, the musicians seemed to respond to each other in an atmosphere of risk taking and challenge that extended their joint creativity. They took risks with musical phrasing, timing and dynamics, and in so doing they challenged each other’s musical creativity. Empathetic attunement was visually evident in expressions of interest (e.g., smiles, collective affirmative nodding and animated body movements). Empathetic attunement was musically evident in the production of a more animated performance of the piece. On occasion this more animated, ‘risk taking’ performance could result in the production of unpredictable musical variations on interpretation when participants engaged each other in challenging musical interaction. Researcher interpretation indicated that these responses went beyond cohesive modes of communication to creative modes of communication.

**Empathetic creativity**

Empathetic creativity was interpreted as having emerged when the string quartet was empathetically attuned and a novel ‘spontaneous musical variation’ was judged to have been produced. Although, theoretically, empathetic creativity could emerge at any time, we propose that it is more likely to emerge during performance than rehearsal. Support for this proposal can be found in Davidson and Good (2002), where the researchers argue that during rehearsal musicians seek to ‘coordinate’ their timing and expression and during performance they seek ‘spontaneous variations’ (2002, p. 188).

Support for researcher interpretations and evaluations was sought from participant judgments of the same performances via a ‘member checks’ procedure (Brown & Gilligan, 1992; Lincoln & Guba, 1985; Punch, 1998; Seddon 2005).

**MEMBER CHECKS**

To provide validation of researcher interpretations participants were individually shown video-clip examples and asked to review and critique the research of which they were the focus. This procedure is known as ‘member checks’, where participants are asked to tell researchers if they have accurately described their experience and produced a ‘recognisable reality’ (Brown & Gilligan, 1992; Lincoln & Guba, 1985; Punch, 1998; Seddon, 2005).

**Procedure**

Following on from the analysis of the video data, the researchers subsequently met with each of the participants individually to conduct the member checks. During these member checks sessions, the six modes of communication, relationships with sympathetic and empathetic attunement, and the concept of empathetic creativity were explained to the participants. The researchers used a ‘script’ for these explanations to ensure explanations were constant for each participant. Multiple examples of the six modes of communication, sympathetic and empathetic
attunement and two examples of empathetic creativity from the video data were recorded on DVD. These recordings were played to the participants and they were asked (1) if they agreed with the interpretations made by the researchers, and (2) if they had any further comments they would like to make about any aspect of the research. The member checks procedures were recorded on audio tape and transcribed for later analysis.

**Results**

All members of the string quartet individually concurred with and confirmed researcher interpretations of the six modes of communication, concepts of sympathetic and empathetic attunement and empathetic creativity. Examples of participants’ further responses to researcher interpretations of each mode of communication were as follows:

**Verbal modes of communication**

- **Verbal instruction:**
  
  During the instruction phase we verify technical issues that don’t need discussing from an aesthetic point of view, because we have to respect the score. This is a very important phase because there could be a printing error. We also verify basic technical elements such as staccato and slurs which are not issues of interpretation but the composer’s instructions. (1st Violinist)

- **Verbal cooperation:**
  
  It is the phase in which some friction can arise between members, because the technical problem of bowing is pretty individual, subjective, and expressing his own vision, which could be different than the other’s vision, ... we have to arrive at a compromise. (2nd Violinist)

  It is really evident that the discussion is heated, animated where the musicians can confront, bring their experiences and consequently before deciding anything we confront each other. (Cellist)

- **Verbal collaboration:**
  
  This is an essential step of a superior level. This is the moment in which you detach from what you’ve heard [commercial recordings of the piece] ... this is the moment in which you free yourself from what you know and you are looking for your own [interpretation]. (Violist)

  Here something more important is entering, something which characterizes the string quartet, the interpretation ... it places the quartet in a certain situation. (Cellist)

  It is the moment in which the ideas of the individuals become common ideas of the quartet. (Violist)

**Non-verbal modes of communication**

- **Non-verbal instruction:**
  
  the Glass quartet is not in the Classical repertoire ... and then a piece that you are studying for the first time, which is not of [your] repertoire, there is always attention for understanding the structure, verifying and being sure that we are doing exactly what is required by the score. (1st Violinist)
Sometimes it is more efficient to demonstrate to the others by playing how a passage should be played more than explaining it in words. (1st Violinist)

- Non-verbal cooperation:
  
  we are still worried about keeping together, of performing all together. (2nd Violinist)

  There is still no ‘flow’ state; that will come ... this is a phase in which the focal points are difficult; we are still not fluid. (Violist)

- Non-verbal collaboration:

  we are certainly in collaboration. Also, for small variations like sonorities produced, we don’t need to say anything because if one component [of the string quartet] is proposing them [sonorities] all the quartet follows and then there is this empathetic phase. (1st Violinist)

- Sympathetic attunement:

  There is still a lot of attention paid to the score but we start to see some gesture, some breathing ... (1st Violinist)

- Empathetic attunement:

  from this moment, during which the artists [musicians] are absolutely concerned with creating a certain magic which for me is all linked with the sound. At this point the quartet is no longer four individuals with their own individualities, their own personalities, their own knowledge; it is only a unique energy. (Cellist)

  In this condition [empathetic attunement] the risks are high ... you are aware that there is a risk but it is a risk that gives great joy because in that moment you are really making music. (Cellist)

- Empathetic creativity:

  It is sufficient that one of the group is performing a note softer so the other members understand his intentions and they follow him because some different things are coming out and many times are more interesting than what we did during the rehearsal. (2nd Violinist)

  If there is no [empathetic creativity] then everything is even. What changes are the dynamics also the tempi which are faster [for allegros] or slower [for adagios]. You don’t worry if it doesn’t happen during the rehearsals because ... it costs effort and psycho-physical stress and during the rehearsal it is not necessary to do that because we know that all four of us will do that [during the concert]. (Violist)

  Sometimes something happens that we did not rehearse at any time. (Violist)

  For me the quartet is the most organically united unit that you can think of because a quartet must breathe as one performer. (1st Violinist)

**Discussion**

**Comparison with a Previously Studied Jazz Sextet**

When comparing the communication processes between members of the string quartet in the current study and the jazz sextet in the previous study it should be taken into consideration that the string quartet was a professional group with many years of experience performing together and the jazz sextet was a student
group rehearsing for their first performance. This difference in individual and collective experience impacts on the complexity of communication processes employed (Davidson & Good, 2002; King, 2006). Also, the availability of a musical score to the string quartet must impact on the level of communication required in the instructional and cooperative modes, as the score will clarify much of what is required from the musicians. However, Cohen argues that a musical score may not be as precise as it appears and can be regarded as representing a ‘range of acoustic possibilities’ (Cohen, 2005, p. 74). Cohen’s argument explains how the musicians in the current study are able to employ collaborative modes of communication to produce novel musical performances through spontaneous musical variations while remaining faithful to the musical score. The similarities in modes of communication between a string quartet and a jazz sextet revealed in the current study are really rooted in the commonalities of purpose of both groups and the underlying similarities in all music as opposed to genre specific differences (for example, both types of ensemble are striving to produce creative, novel musical performances at every concert). These similarities of communication can be accommodated without ignoring the important differences discussed in research related to specific genres.

Differences in communication between members of the string quartet and the jazz sextet were of content rather than the actual mode of communication. In the string quartet, verbal instruction was usually more focused on the verification of notes or dynamic instructions in the written score. In the jazz group, verbal instruction usually involved one member of the group instructing the others on the structure of the piece around which they intended to improvise. For verbal instruction, the content varied from string quartet to jazz sextet, but the mode of communication remained the same. For verbal cooperation, a similar situation occurred. Democratic discussion occurred between the members of both groups to resolve issues of cohesion in performance. In the string quartet, discussions focused on issues of bowing or whether or not to observe repeat signs in the score. In the jazz sextet, discussions focused more on potential sequences of solos and endings, because there was no pre-composed score to determine these issues. The availability of the score influenced the content of the discussions, but, essentially, both groups were engaged in verbal cooperation to resolve issues of cohesion rather than aesthetic or creative issues. When considering verbal collaboration, there was little to differentiate between the two groups. This mode of communication was adopted by the musicians to democratically resolve aesthetic, creative issues. For the string quartet, issues of interpretation were evaluated and discussed. For the jazz sextet discussion and evaluation of improvised solos occurred. A similar situation emerged when considering the non-verbal modes of communication.

Non-verbal instruction was also very similar in both groups with members giving aural demonstrations using the voice or their instruments to indicate how something in the piece should be played. For the string quartet, non-verbal instruction also included a behaviour that involved the musicians focusing exclusively on the score in initial rehearsals when the piece was being learned (i.e., the non-verbal instruction was essentially made by the score). This occurred to the extent that minimum levels of intra-musician communication were observed during this phase (confirmed by musicians in the member checks procedure). The equivalent of this
in the jazz sextet was when members learned the tune or ‘head’ of the piece from one another by ear. Non-verbal cooperation was essentially the same for the string quartet and jazz sextet. Both groups achieved sympathetic attunement for this mode of communication and through a combination of body language, facial expressions, eye contact and musical cues were able to produce cohesive performances. Differences emerged in the style of the body language and facial expressions that were interpreted to be related to accepted conventions in either genre. In the string quartet, synchronized instrument/body movements between musicians in certain passages to facilitate or emphasize cohesion or bowing was more evident than in the jazz sextet. This type of behaviour in a string quartet is related to accepted convention in the genre. In the jazz sextet, one member tapping his head meant that all members were to return to the head (main tune) at the next most suitable musical moment, a behaviour that is conventional in jazz groups but would be considered strange between members of a string quartet. The importance of musicians’ body movements and gestures in non-verbal communication during rehearsal and performance cannot be over-emphasized. Research by Davidson (2005) and Clayton (2005) reports in detail the differences in the roles of such gestures and their impact on both co-performers and audience in relation to specific genres and cultures. Both these researchers discuss how body language and gesture impacts on co-performers’ cooperative and collaborative communication across a wide range of musical genres. In the current study, these genre-specific actions were observably different, but the underlying mode of non-verbal cooperation was interpreted as being the same in both groups. Non-verbal collaboration was also the same for both the string quartet and jazz sextet. Both groups of musicians became empathetically attuned and employed non-verbal collaborative modes of communication to develop and express the creative and expressive qualities of the music they were playing.

Results also showed that the classical musicians in the current study were able to collectively create ‘spontaneous musical variations’ while empathetically attuned during the concert performance. The emergence of spontaneous musical variations supports the results of research reporting spontaneous musical variations during performances by other string quartets (Cohen, 2005; Murnighan & Conlon, 1991; Sawyer, 2006). It is proposed that two examples of spontaneous musical variations perceived by the researchers and confirmed by the musicians in the string quartet during the member checks procedure are examples of empathetic creativity and constitute novel musical performances (Seddon, 2005). One might think that when playing jazz music, musicians have more freedom of expression than when playing classical music. However, musicians from both genres are obliged to follow ‘conventions’ and the perceived freedom of jazz improvisation is often a myth (Berliner, 1994). Also, the idea that classical musicians simply ‘realize’ music from the score is clearly overly simplistic. There is evidence from the literature (Murnighan and Conlon, 1991; Sawyer, 2006) which is supported in the results of the current study that when groups of classical musicians perform, they strive to achieve a ‘novel musical performance’ every time. The example below taken from the member checks procedure supports this assertion.

Q (Researcher): Are you experimenting something in the performance?
A (Cellist): Absolutely yes, otherwise it becomes very boring and it doesn’t take you any-
where, instead for us the concert, every concert, is different. Every concert is starting
again from the beginning.

It should be noted that there is a potential for researcher bias to influence member
checks. For example, when the researcher describes the interpretations made, the
participant may be influenced by the researcher and may find it difficult to disagree
with the researcher’s interpretation. During the member checks procedure in the
current study, the researchers were aware of the potential for bias and made every
effort to describe the interpretations objectively and allow the participants every
opportunity to disagree. Moreover, a good rapport was developed between the parti-
cipants and the researchers over a period of several months. In addition to this, it
should also be noted that the participants were articulate adults with many years
of experience and very strong professional opinions about what they were doing
and were also used to voicing their opinions. It is also important to note that these
six modes of communication can be individually characterized but are seldom used
completely separately. For example, often in this study the musicians would change
from verbal to non-verbal modes and back again when examining issues. Also, there
were times when the technical resolution of bowing issues were related to issues of
interpretation, which indicated they were moving between verbal cooperative to
collaborative modes.

The results of this research study with the string quartet and the comparison of
modes of communication between the two different musical groups provide support
for the findings of the previous study with the jazz sextet, which proposed the
concepts of six modes of communication, sympathetic and empathetic attunement
and empathetic creativity (Seddon, 2005). It could also be argued that the findings of
this study expand what we currently know about communication during rehearsal
and performance of small ensembles, because they offer a theoretical framework for
the emergence of ‘empathetic creativity’ exemplified through ‘spontaneous musical
utterances’ during jazz performances and ‘spontaneous musical variations’ during
classical performances. It provides empirical evidence of a hierarchical structure
of modes of communication linked to rehearsal and performance that can also be
linked to musicians’ personal and collective experience. The identification of these
modes of communication provides music educators involved with teaching small
musical ensembles such as string quartets and jazz groups with a clearer structure
and a specific vocabulary with which to address important aspects of ensemble
playing.

ISSUES FOR FUTURE RESEARCH
During the course of the interviews conducted for the member checks procedure,
some interesting issues were raised by the musicians that either supported prior
research or raised interesting avenues for future research in this field. For example,
the modes of communication between these professional musicians in this string
quartet were very well developed over a substantial period of time. This meant
that they were able to dedicate large amounts of time in verbal and non-verbal
collaborative modes democratically resolving aesthetic issues such as musical
meaning. This contrasts with the student string quartet that was the focus of the
Davidson and Good (2002) study where, because of their lack of experience, the student musicians tended to focus on technical and individual concerns. However, anecdotal accounts of occasions when musicians from many genres just ‘click’ together would seem to contradict this finding. This could be an interesting area for future study. In the current study, the musicians allocated a high proportion of time to playing rather than talking, which supported the notion of ‘time out strategies’ reported in Davidson and Good (2002). This observed time allocation issue raises questions about how quartets rehearse and perform. This is an area of research that is currently under-researched and could provide much-needed pedagogical support for the teaching of small-ensemble playing in music conservatories. For example, students could be advised on ‘decentring’ processes to enable them to develop empathetic attunement and collaborative modes of communication (Seddon, 2005). During the current study, links between modes of communication and rehearsal strategies/stages emerged. For example, instruction modes were more dominant when beginning the rehearsal of a new piece. Cooperative modes were linked to ‘middle phases’ of rehearsing a piece and collaborative modes towards the end of the rehearsal process. Investigating group rehearsal strategies and communication would be an interesting focus for future research. How do small groups of musicians prepare to create novel musical performances in every concert? One possible answer is by progressing through a hierarchical communication process, developing empathetic attunement, which can result in empathetic creativity producing novel musical performances.

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