ARTICLE

Group creativity: musical performance and collaboration

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ABSTRACT In this article, I focus on three defining characteristics of group creativity: improvisation, collaboration and emergence. To demonstrate these three characteristics, I present several examples of group creativity in both music and theater. Then I explore how structure and improvisation are always both present in group creativity. Improvisations contain elements of structure and structured performances contain improvisational elements. I conclude by suggesting some implications for musical education and for education in general.

KEYWORDS: *conversation, emergence, improvisation, jazz, theater*

My studies of group creativity focus on the most unstructured, most improvisational groups: musical and theater ensembles, everyday conversation, and collaborative work groups. Because I've been a jazz pianist for many decades, the small jazz group guides my intuitions about how musical collaboration and group creativity work. Based on this research, I've identified three characteristics of group creativity:

- *Improvisation*: in most forms of group creativity, the creativity happens in the moment of the encounter. In music and theater, the performers are not mere interpreters; they are creative artists.
- *Collaboration*: the creativity of a group cannot be associated with any one person. All members contribute and their interactional dynamics result in the performance.
- *Emergence*: emergence refers to collective phenomena in which, as it is said, 'the whole is greater than the sum of the parts'. Recent studies of emergence by complexity scholars suggest that emergent phenomena are unpredictable, contingent and hard to explain in terms of the group's components.

To demonstrate these three characteristics of group creativity, I begin by presenting several examples of group creativity, in both music and theater. Then I explore how structure and improvisation are always both present in group creativity. Improvisations contain elements of structure and structured performances contain improvisational elements.

I conclude by suggesting some implications for musical education, and for education in general.

The conversations of jazz

Ingrid Monson's 1996 book *Saying Something* analyzed many examples of musical collaboration in jazz, along with transcribed musical notation that demonstrated in wonderful detail how musicians converse in a jazz improvisation. Monson described an interview with drummer Ralph Peterson in which she played a tape of a live performance of Peterson's composition 'Princess' with pianist Geri Allen and bassist Essiet Okon Essiet. During Allen's solo, Peterson's drum accompaniment was very dense, and there were several instances in which Allen and Peterson traded ideas with each other. During the interview, Monson and Peterson sat together and listened closely to the tape. Monson recognized that one of the conversational exchanges seemed to be based on the distinctive, catchy pattern from Dizzy Gillespie's famous performance of 'Salt Peanuts' and noted this to Peterson. He replied:

> Yeah! 'Salt Peanuts' and 'Looney Tunes' – kind of a combination of the two. [Drummer] Art Blakey has a thing he plays. It's like: [he sings a rhythmic phrase from the song]. And [pianist] Geri played: [he sings Allen's standard response]. So I played the second half of the Art Blakey phrase: [he sings the second part of Blakey's drum pattern]. (Monson, 1996: 77)

Geri Allen immediately recognized the musical quotation from her performances with Blakey and then responded with her usual response, indicating that she recognized and appreciated Peterson's communication (musical transcripts can be found in Monson, 1996: 78–9). As in this example, musical communication in jazz depends on all of the musicians knowing the 'language' extremely well – not only the notes of the songs, but even knowing how a certain performer typically plays a certain song with a specific other performer. Peterson then told Monson:

> But you see what happens is, a lot of times when you get into a musical conversation, one person in the group will state an idea or the beginning of an idea and another person will *complete* the idea or their interpretation of the same idea, how they hear it. So the conversation happens in fragments and comes from different parts, different voices. (Monson, 1996: 78)

Monson, herself a jazz drummer and trumpet player, concluded her example by writing 'There is a great deal of give and take in such improvisational

interaction, and such moments are often cited by musicians as aesthetic high points of performances' (1996: 80).

Jazz musicians engage in this sort of conversational exchange in the improvised ensemble activity known as 'trading fours' or 'trading eights', the number referring to the number of measures that a soloist is allocated to play before the next soloist begins. Because the chorus form is 32 measures, trading eights is a relatively rapid transition; each player has barely enough time for one or two phrases. Rather than develop their own musical ideas or starting a completely new idea, each musician continues in the spirit or mood established by the prior players, responding to, and building on, the prior musician's eight bars (Berliner, 1994: 369–70). Rufus Reid told Berliner how he tries to weave the prior soloist's ideas into his own solo, but not always in an obvious way, and not always by direct quotation; he said it was more interesting to elaborate on the prior idea. In their musical conversations, musicians constantly balance coherence and innovation, borrowing material from the previous phrase and then transforming it.

The dialogues of improvisational theater

In improvisational theater, an ensemble of actors creates a scene on stage, without any prearranged dialogue, no character assignments and no plot outline. Everything about the performance is collectively created by the actors, on stage in front of the audience. The following brief transcript of the first 30 seconds of an improvised theater sketch, which lasted a total of about 5 minutes, helps to demonstrate the collaborative, contingent, and emergent aspects of improvised dialogues.

EXAMPLE 1

Four actors stand at the back of the stage. Actor A begins the scene.

(1) (*Actor A walks to center stage, pulls up a chair and sits down, miming the action of driving by holding an imaginary steering wheel*)
(2) (*Actor B walks to A, stands next to him, fishes in pocket for something*)
(3) A: On or off?
(4) B: I'm getting on, sir. (*Continues fishing in his pocket*)
(5) A: In or out?
(6) B: I'm getting in!
I'm getting in!
(7) A: Did I see you tryin' to get in the back door a couple of stops back?
(8) B: Uh . . .

Actor A, taking the first turn, is able to act without creative constraints. His initial non-verbal act is to sit in a chair and mime the act of holding a steering wheel. This suggests that he is the driver and is sitting in a vehicle. However, this initial suggestion leaves many possible options for Actor B in turn (2). For

example, B could have pulled up a second chair and sat down next to the 'driver', and he would have become a passenger in a car. A's initial act does not indicate whether the vehicle is moving or not; it does not indicate the type of vehicle; it does not indicate the role of his character, nor the relationship with any other character. B's act in (2) also leaves many options open for A in turn (3). In (3), for example, A could have addressed B as his friend, searching for theater tickets. The range of dramatic options available on stage are practically unlimited: for example, at (2), B could have addressed A as Captain Kirk of Star Trek, initiating a TV-show parody. A's utterance (3) begins to add more detail to the emerging dramatic frame. 'On or off' would not be an appropriate statement for a car driver. It suggests that A is a professional driver of a bus (but also, note, is compatible with A driving a plane, boat, or spaceship). (3) also implies a relationship: B is a paying customer of A.

A few minutes of examination of any improvisational transcript indicates many plausible, dramatically coherent utterances that the actors could have performed at each turn. A combinatorial explosion quickly results in hundreds of potential performances, branching out from each actor's utterance. This combinatorial unpredictability leads improvisational interaction to be highly contingent from moment to moment. In spite of this contingency, by (8) the actors have established a reasonably complex drama, a collectively created dramatic frame that will guide the subsequent dialogue. They know that A is a bus driver, and that B is a potential passenger. A is getting a little impatient, and B may be a little shifty, perhaps trying to sneak on. In the remainder of the sketch, the actors must retain dramatic coherence with this frame. Of course, each actor's turn will suggest additional details or plot twists; the dramatic frame is always changing, emerging from the acts of all actors.

Example 1 was the first eight turns of a 5-minute improvised scene. Some of the more ambitious Chicago groups perform a fully improvised 1-hour play; because these improvisations are so much longer than the more typical short scenes, this is called *long form* improvisation. For example, in 1993, I videotaped many performances of a group called Jazz Freddy (see Sawyer, 2003b). The actors chose this name to emphasize the similarities between their free-form style of improvisation and the musical interactions of a jazz ensemble. Each night, Jazz Freddy performed a fully improvised 1-hour play, in two acts separated by an intermission. On 24 April 1993, just after the lights went up, two cast members stepped to the front of the stage and quieted the audience. The first asked the audience to suggest 'an event' and someone shouted, 'The Olympics'. The second actor asked the audience to provide 'a location' and someone shouted, 'A convent.'

The lights went down, as the 10 cast members walked to the sides of the stage to sit in chairs that had been placed there. One of the actors, John, pulled a chair to the center of the stage and sat in it, facing the audience, as the stage lights came up.

EXAMPLE 2

Lights up. We see John carrying a chair to front stage right and he sits down facing the audience. He mimes working at a desk – takes a cap off a pen, opens a book, starts to make underlining motions as he studies the page. He stops to rub his eyes. He then turns the page, and underlines some more. The other actors watch intently from the sides of the stage; the audience is completely quiet. After about 20 seconds, Mary stands up from her position at the opposite side of the stage, and walks over to John, miming the act of carrying something in both hands, held in front of her:

(1)	Mary	Here are those papers.	*Puts down the 'papers'.*
(2)		(2 second pause.)	*She remains standing.*
(3)	John	Thanks.	*Looks up to face Mary.*
		(2 second pause.)	
(4)		I really appreciate your doing those copies for me.	
(5)			*Bill approaches from stage left, also carrying 'papers', and stops next to Mary.*
(6)	Bill	Here are those papers.	*Puts down the papers.*
(7)	John	Thanks a lot,	*Still facing the two.*
(8)		You guys have really been great.	
		(2 second pause.)	
(9)		I'm gonna stop booking for now	*Closes book on desk.*
(10)	Mary	[OK]	
(11)	Bill	[Sure]	
		(1 second pause.)	
(12)		I'm gonna go get some more papers.	
(13)	John	Alright	*He stands up.*
		(1 second pause.)	
(14)		Thanks a lot, I appreciate it.	
(15)	Bill	You're welcome.	
		(1 second pause.)	
(16)		We mean it.	*As he says this, Bill touches Mary's arm; Mary reaches up her other hand to grasp his hand; they stand holding hands.*
(17)	John	Thanks for being in my corner.	
(18)	Bill	We always will be.	

A few minutes further into this scene, the actors collectively decided that the scene would begin a plot associated with the 'Olympics' suggestion. After about 5 minutes and three distinct scenes, the group collectively transitioned to a new plot line, this one taking place in a convent.

In the beginning of this performance, the actors leave unusually long pauses between their turns of dialogue, because they are just getting into the flow of the evening's performance. As the basic elements of the plot begin to

emerge, the actors develop a rhythm and the pace accelerates; as the performance progresses, they leave shorter pauses and the dialogue begins to sound more like a normal conversation. The dramatic frame gradually gathers steam; in the first 30-minute act, the group creates two distinct plots, one associated with the Olympics and one taking place in a convent. In the second act, the plots begin to weave together, as several of the female athletes decide to become nuns.

This Jazz Freddy dialogue demonstrates the key characteristics of group creativity. It is unpredictable, particularly in the timing and pacing of the interaction; the actors do not know who is going to speak next, nor when they will begin speaking. As a result, anyone can take the next conversational turn; it is impossible to know ahead of time who it will be. Even an offstage actor can walk on and take the next turn, as Bill does in turns (5) and (6). More so than Example 1, the dialogue turns each leave a wide range of potential future possibilities still open. The dialogue demonstrates the moment-to-moment contingency associated with group creativity. The creation of the dramatic frame is fundamentally collaborative; no single actor imposes an idea for the scene on the others. Instead, the elements of the drama collaboratively emerge from the collective actions of the group. The dramatic frame is an emergent group-level phenomenon, impossible to explain in terms of the individual actor's creative impulses or inspirations.

The centralized mindset

The key characteristics of group creativity are improvisation, collaboration, and emergence. But we tend to neglect these characteristics. Instead, we often try to attribute the group's creativity to a single person: the group leader, the soloist, the director or conductor. For example, famous jazz photographers like Herman Leonard or William Gottlieb are best known for their close-up portraits of famous musicians. The canonical portrait shows the soloist lost in thought, often with his eyes closed, oblivious to his surroundings. Such photos reinforce our instinctive tendency to attribute group creativity to a single person's genius, rather than to the group's emergent dynamic. For the cover of my 2003 book *Group Creativity*, I wanted to use a classic black and white jazz photograph of an entire group, visibly engaged in group interaction (Sawyer, 2003a). I had a hard time finding such a photo, even though I knew from my own playing experience that musical interaction is at the center of jazz. Ingrid Monson was the first to emphasize the importance of collaborative interaction in the rhythm section in her 1996 book *Saying Something*, and she, too, had a hard time finding the group photo that appeared on the cover of her book (personal communication).

If group communication is the essence of live jazz, then why do so many photos isolate a single musician away from the rest of the band? Because of what Resnick (1994) called our 'centralized mindset'. Most of us, when faced

with an example of an emergent group phenomenon, almost subconsciously assume that there is a single leader or organizer. Resnick used the example of the flock of geese, migrating south in a 'V' shape. When you see a V-shaped flock of birds, you probably assume that the bird in front is leading, and that the other birds are following. In fact, this isn't the case – most bird flocks don't have leaders at all. Rather, the orderly 'V' shape that crosses the sky emerges from all of the birds acting together, each responding only to the ones nearby. Like group creative performances, the flock is organized without an organizer.

Resnick points out that our centralized mindset almost invariably leads us to assume that complex group behavior results from a central controller. It's the same mindset that makes improv theater audiences assume that the group secretly has a script, or that makes you assume that a traffic jam must have been caused by an accident or a broken down car, even though many traffic jams are emergent phenomena – collectively 'caused' by the interactional dynamics of many cars engaged in complex traffic patterns (Resnick, 1994).

Back to the script

Group creativity isn't all improvised anew in each performance; there are common elements that are repeated across many performances. There is always some structure in improvisational performance; we even use scripted lines in everyday conversation. Example 3 reproduces the dialogue from a Sunday newspaper 'Blondie' cartoon from 1996. The comic strip is about a stereotypical 1950s nuclear family, living an almost comically ordinary suburban lifestyle. Dagwood has just arrived at the barber shop, and is sitting down in the barber's chair, as the barber welcomes him from behind the chair. The dialogue goes as follows:

EXAMPLE 3

Barber:	The usual?
Dagwood:	Yep.
Barber:	How's all the family?
Dagwood:	They're fine.
	(*The next two frames show the barber silently snipping Dagwood's hair.*)
Dagwood:	Usually your third comment is 'Think it's going to rain?' What happened?
Barber:	(*Burying his head in his hands in shame*) I knew this would happen some day . . . I forgot my lines!

In everyday situations like getting a haircut, we often use lines that we've heard other people use – we don't always make up completely new things to

say. When the barber says, 'How's all the family?' no one would claim that he's being creative. These aren't really his own words, since thousands of people have said exactly that line in exactly that situation before. Like the barber, we often use catchphrases in conversation – phrases like 'Could I talk to you for a minute?' or 'Give me a break.' Because a million people have said exactly the same sentence, we could think of these sentences as scripted lines. Linguists call these little bits of script *formulaic speech*. But using formulaic speech still requires improvisational creativity; a catchphrase can send many different implicit messages, depending on the situation.

Example 4 displays some catchphrases from a textbook teaching English as a second language (ESL). These bits of formulaic speech show that learning another language isn't just about vocabulary and grammar rules, it's about learning the catchphrases and the right way to use them creatively.

EXAMPLE 4

How are you?
My name is _____.
I am ____ years old.
I like to eat fish and apple.
My favorite color is red.
Thank you!

You're not the creator of these catchphrases, and when you say them, you're not really speaking your own words. For example, when someone says, 'Go ahead, make my day,' you can't help but think of Clint Eastwood's character in the movie *Dirty Harry*, and you might also recall President Reagan's famous repetition of the line.

The idea that speakers often use language that they inherit from prior speakers was an important theme of the Russian literary theorist Mikhail Bakhtin (1981). Bakhtin argued that even though each speaker intends his or her words to have a novel, personal meaning, those words have unavoidable connotations associated with past situations of use. A catchphrase demonstrates this point particularly well, because it's so obvious that the line has been spoken by others before. When we use a catchphrase, or say something with a stereotypical inflection or accent, everyone can't help but think of all of the other occasions on which they've heard the same thing. These connotations are like unavoidable baggage that the words bring with them from past situations of use; they're built into the catchphrases, the price we pay for using them. Bakhtin coined the term *dialogic* to describe this two-leveled nature of language; the two levels are the speaker's own meaning, and everyone's memory of how these words have been used in the past.

The structures used in improvisation aren't always verbal. Actors assume that they share a lot of cultural knowledge with the audience; and actors wouldn't be able to communicate so quickly with each other unless they

shared a large body of cultural knowledge and practices. Good improv actors are pop-culture experts, and improv actors assume that the audience will catch the references they make to popular TV shows or movies: bits and pieces of dialogue, familiar characters, or events from a famous sitcom episode or movie scene. Bernie Sahlins, a founder of The Second City theater in Chicago, explains that these pop culture references are a shorthand way of communicating quickly with your fellow actors and with the audience (see his interview in Sweet, 1978). Improv actors know that each social group has its own distinctive speech style and catchphrases; a well-chosen catchphrase or a distinctive accent can implicitly tell us a great deal about a character: ethnic background, profession (lawyer or doctor), family role (father or son), status (an authority figure such as a policemen or the boss), distinctive cultural stereotypes like cowboy, Southern redneck or gay male. When the first actor steps to the front of the stage and starts to enact a 'Mad German Scientist' character, a whole set of script possibilities is immediately suggested and other possibilities get closed off. Actors use these styles of talking to communicate characters and situations, quickly and implicitly communicating to each other about the emerging drama.

This kind of implicit communication is an example of what linguists call *indexicality*, from the Latin word for 'point to' or 'indicate'. Your words are indexical when they indicate something about the situation that isn't in the literal meaning of the words. Using a well-known catchphrase or speech style is indexical, because it implicitly communicates something about the situation; for example, if an actor starts talking in a southern US accent, he or she implicitly communicates to the audience that the setting for the scene is somewhere in southern USA, without ever having to say, 'Here we are in Ole' Mississippi'. Some linguists estimate that as much as 90 percent of all of our spoken language is at least partially indexical – in other words, very little of what we say is completely context-free (e.g. Bar-Hillel, 1954).

The structures of improvisation

> The freer the form, the greater must be the underpinnings of discipline. (Ted Flicker, quoted in Sweet, 1978: 161)

Although improv ensembles improvise their dialogue, there are two forms of structure that guide their emergent improvisations: scenarios that guide the overall improvisation and formulaic speech that actors use in their individual lines. These structures are always in dialectic with improvisation.

These two kinds of improvisational structures have parallels in musical improvisation. Parallel to an overall scenario that guides an improvisation, most jazz improvisations are based on the structure of the chorus of the mid-American popular song. The chorus is 16 or 32 bars, with an AABA or ABAC structure. For example, the jazz standard 'How High the Moon' was one of Charlie Parker's favorites, with an ABAC structure. He liked it so much, he

wrote another song using the same overall structure, known as 'Ornithology'. 'Ornithology' is 'by' Charlie Parker, but he didn't try to hide the fact that it had the same harmonic structure as 'How High the Moon'. Is it really a different song, or is it the same song? How different does it have to be?

These overall structures correspond to the ritualized conversational exchanges that fluent native speakers can jointly participate in, without even thinking hard about it: the greeting routines taught in ESL classes or the small-talk exchanges between Dagwood and the barber.

In musical improvisation, scholars have identified parallels with formulaic speech. These are usually known as 'motifs'; some improvisational traditions are referred to as 'motivic improvisation', meaning that the performer's creativity rests in choosing which one of a set of conventional musical phrases will be played next. Some jazz performers improvise in a partially motivic style; for example, Charlie Parker had a repertoire of over 100 personal licks that he used repeatedly, in many different solos (Owens, 1995). These correspond to scripted bits of conversation like 'How are you?' except that they are idiosyncratic, associated specifically with Parker.

The three characteristics of group creativity – improvisation, collaboration, and emergence – all take place within a background of structuring elements. Yet the existence of these structures does not detract from the emergent, collaborative nature of group creativity. In fact, improvisation could not take place at all without some shared conventions, because otherwise communication would be impossible.

Group flow

> Tonight, things are going well. Tonight, watching them improvise is like watching an expert surfer. The surfer's incredible balance keeping him constantly poised on the crest of a wave; the cast, working from instinct rooted in hours of workshops and past improv sets, riding the crest of the moment. When they are on top, it is a sight to see. There is a thrill in watching them, a thrill born of the precariousness of their position and the ever-present threat that a misjudgment may send them hurtling into a wipeout. (Sweet, 1978: xxxix)

There are many metaphors one can use to describe a talented ensemble when they are 'on', in interactional synchrony, performing well. One might say that they have a *good chemistry*, or that things are *clicking* or *in sync*. For example, Jimerson (1999) wrote about a pick-up basketball team, 'we played quietly and efficiently. We rarely spoke and played effortlessly and effectively. As teammates, we were "in sync" with each other' (p. 13). For just about any sports team, one can speak of the *group spirit*, the *team spirit*, or the *esprit de corps*. A commentator might say *they gelled as a unit* or that they displayed *good teamwork*. All of these metaphors focus on the entire group and on their performance together as an ensemble. Even if the individual

performers are prepared and focused, a good ensemble performance doesn't always emerge.

When a group is performing at its peak, I refer to it as being in *group flow*, in the same way that an individual performing at his or her peak often experiences a subjective feeling of flow. The concept of group flow is related to Csikszentmihalyi's (1990) flow theory, but with a critical difference. Csikszentmihalyi intended flow to represent a state of consciousness within the individual performer, whereas group flow is a property of the entire group as a collective unit. Group flow has been neglected in studies of flow, which have focused on how individuals attain flow through their own actions (cf. Jimerson, 1999). In group flow, everything seems to come naturally; the performers are in interactional synchrony (Sawyer, 2003a). In this state, each of the group members can even feel as if they are able to anticipate what their fellow performers will do before they do it.

Group flow is an emergent property of the group. Group flow can inspire musicians to play things that they would not have been able to play alone, or that they would not have thought of without the inspiration of the group; 'the highest points of improvisation occur when group members strike a groove together' (Berliner, 1994: 388). In a study of pick-up basketball games, Jimerson (1999) wrote that flow is caused by groups when it is 'a result of their interaction with other people, [who] cooperatively maintain their flow, and respond to each other differently than they did before' (p. 35). Group flow helps the individual performers to attain their own flow state. When jazz musicians describe the subjective experience of performing in a group, they frequently refer to the important role played by the emergent group flow in propelling their own performance to ever higher levels: 'Sometimes, I really feel that I am just the vehicle, the body, and that something is really singing through me, like I am not controlling everything that I am singing' (Carmen Lundy, in Berliner, 1994: 392).

Like other emergent phenomena, group flow is hard to predict in advance, even knowing a great deal about the psychologies of the participating performers. Jazz musicians and improv theater ensembles alike have little idea how successful a performance will be; there are simply too many intangible factors that cannot be known until the performance begins. Franklin Gordon said: 'It doesn't happen every single night . . . but at some point when the band is playing and everyone gets locked in together, it's special for the musicians and for the aware, conscientious listener. These are the magical moments, the best moments in jazz' (Berliner, 1994: 388).

Musicians use a wide variety of metaphors to describe group flow: riding a wave, gliding across a ballroom with a dance partner, or lovemaking (Berliner, 1994: 389). Jazz bassist Chuck Israels says: 'If it's working, it brings you very close. It's a kind of emotional empathy that you develop very quickly. The relationship is very intimate' (Berliner, 1994: 349–50). Curtis Fuller said: 'when that's really happening in a band, the cohesiveness is

unbelievable. Those are the special, cherished moments. When those special moments occur, to me, it's like ecstasy. It's like a beautiful thing. It's like when things blossom' (Berliner, 1994: 389). There is an open communicative channel among the performers; each performer is open and listening to the others and each performer fully attends to what the others are doing, even as they are contributing to the performance themselves. Melba Liston said: 'everybody can feel what each other is thinking and everything. You breathe together, you swell together, you just do everything together, and a different aura comes over the room' (Berliner, 1994: 392).

Many Chicago improvisers refer to group flow using the term *groupmind*. Groupmind is the entire troupe working intuitively together toward the same goals. The perfect working of groupmind is an intense experience; comedian Jim Belushi famously said that the high that comes from group flow was 'better than sex' (Seham, 2001: 64; compare Berliner on jazz, 1994: 389). Actor Alan Alda referred to this state, saying 'you're actually tuned into something that's inside the actor's mind and there's a kind of mental music that's played and that everybody shares' (Sweet, 1978: 326). Improv actors often speak of group flow as 'a state of unselfconscious awareness in which every individual action seems to be the right one and the group works with apparent perfect synchronicity' (Seham, 2001: 64). Performers often talk about the groupmind in spiritual terms, and believe it channels 'a truth beyond their own conscious reasoning' (Seham, 2001: 64).

In musical ensembles, group flow requires a type of parallel processing; the musicians are playing non-stop, yet while they are playing they must simultaneously listen to their band members, hearing and immediately responding to what they are playing. 'You have to be able to divide your senses . . . so you still have that one thought running through your head of saying something, playing something, at the same time you've got to be listening to what the drummer is doing' (Sawyer interview). You can't relax your attention or else you will fall behind. Bassist Chuck Israels said: 'From the very moment the performance begins, you plunge into that world of sounds . . . and your whole consciousness changes' (Berliner, 1994: 348). Improvisational musicians often try to replicate this experience mentally as they practice alone. For example, a drummer might imagine a bass line as he plays (Berliner, 1994: 350).

In both jazz and improv, we find that groups performing at their peak are in a state of group flow akin to Csikszentmihalyi's (1990) flow. Group flow is an emergent group property and is not the same thing as the psychological state of flow. It depends on interaction among performers and it emerges from this process. The group can be in flow even when the members are not; or the group might not be in flow even when the members are. The study of group flow thus requires a fundamentally social psychology and must proceed by examining the interactional dynamics among members during performance.

Group creativity in scored music

> There is in principle no difference between the performance of a modern orchestra or chorus and people sitting around a campfire and singing to the strumming of a guitar or a congregation singing hymns under the leadership of the organ. 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: 177)

Even in scored and conducted ensembles, group creativity is necessary to an effective performance, because a score under-determines performance. Otherwise, 'performing works would be akin to minting coins' (Godlovitch, 1998: 85); as orchestral musicians sometimes put it, 'you're either making music or just playing notes' (Faulkner, 1983: 74).

Several studies of orchestral interaction have been inspired by Schutz's classic 1964 paper 'Making Music Together', which emphasized the interactional processes in ensemble music. Schutz noted that many musical groups achieve synchrony and intersubjectivity without a conductor. Several studies of interaction in musical groups have been influenced by Shutz and his focus on intersubjectivity; for example, Malhotra (1981) studied the gestural communication that serves to coordinate an orchestral performance. She discovered that although the conductor plays an important role in organizing the performance, musicians do not always attend visually to the conductor, and 15 percent of them report *never* looking at the conductor. When not attending to the conductor, musicians hear and see those sitting near them, and much of the ensemble coordination occurs through gestures, facial expressions, and bodily movements. For example, 'the first violinist's raised eyebrow may indicate to a second violin that he or she is playing slightly flat and must raise his or her pitch. The nodding of the first bassoonist's head or raising of the right eyebrow can cue in the second bassoon' (1981: 105–6).

As Weeks (1996a) noted, much of the ensemble interaction among musicians is hidden from the audience during a performance and the intention of all involved is to give the audience the somewhat misleading impression that the musicians are reading 'the musical text as the composer intended it, under the direction of the conductor *then-and-there*' (p. 248). Weeks focused his research on rehearsals, analyzing the interactions of talk and gesture that serve to coordinate the performance and to help the musicians reach a common understanding of the piece. This coordinating talk is completely absent from public performance, and many of the non-verbal gestures are omitted as well. In Weeks's analyses, ensembles require the most interactional work to coordinate temporal features of the performance: the initial tempo of the piece; the rate to slow down the tempo in a ritardando – a passage in which the composer has indicated that the tempo should slow down; and the relative durations of the fermata, a mark

on the score that indicates that a note should be held for an indeterminate length of time (1996b).

Improvisational coordination becomes salient when one of the performers makes a mistake, playing a wrong note or losing the tempo of the piece. Musicians refer to this as 'covering up' a mistake. Weeks (1990) analyzed the interactional processes that occurred during the rehearsal of a chamber group of seven musicians that had no conductor. He documented how a cellist and pianist executed a series of 'collaborative maneuvers' (p. 211) to recover from several mistakes made by the cellist, so that the performance could continue in such a way that the average listener would not notice the variation. The covering-up action involved a retrospective contextualization of the mistake, redefining it by modifying the scored performance that immediately followed so that it retroactively seemed to have been the correct note or tempo to have played (p. 216). The ensemble's modification resulted in dropping almost two beats from the scored performance. Weeks (1990) concluded that 'although the score has served as a guide, the determination of the specific place the group is at a given moment is thereby a complex *collaborative accomplishment*' (p. 219).

Educational implications

My focus on group creativity and collaborative improvisation treats music as a communicative activity. Music is a collaborative practice, and improvised group music results in an emergent, unpredictable performance. But many educators teach music as a solitary activity – practicing fingering and scales for hours, at home alone; studying to learn how to read notated music effortlessly; memorizing a solo piece for recital performance. But if music is a collaborative practice and if communication is central to musical creativity, then our educational methods should emphasize group interaction. There are some exciting new projects designed to teach children by drawing on the power of group creativity and communication.

For example, the Toy Symphony Project was developed by the Hyperinstruments research group at the MIT Media Lab in Cambridge, MA, USA. Its goal is to introduce children to the creative music-making process by using specially designed 'music toys' that enable children to engage in sophisticated performing and composing – activities normally accessible only after years of study. Through the use of two specially designed music toys called Beatbugs and Music Shapers, children and adults alike can shape and modify musical lines with expressive gesture and delicate touch. The research group also developed a graphical composition tool, Hyperscore, that allows children to draw dots and lines that the computer then turns into musical compositions.

The Beatbug is an example of a music toy designed to encourage musical collaboration among students (Jennings, 2003; Weinberg et al., 2002). The Beatbug is a hand-held percussion instrument, about the size and shape of an

Easter egg. Beatbugs are designed to be played in groups of eight and all eight are connected to the same Macintosh computer. The Beatbug is held in one hand and struck with the other, sending a signal to the computer to produce a percussion sound. The synthesized sound is played through speakers placed in the room and through a small speaker inside the Beatbug. Each of the eight Beatbugs produces its own distinctive timbre and light emitting diodes (LEDs), which flash to provide additional visual feedback.

In concert, the eight Beatbugs are placed in 'snake' mode, which is designed to encourage maximum group interaction and communication. The leader begins by making a short rhythmic motif, which is then sent (by the computer) to another member of the group. That player then has the option to embellish and manipulate the pattern before sending it on to a third player. After the pattern makes several cycles through the group, the pattern is assigned permanently to one of the Beatbugs. This pattern continues to play in the background as the 'snake' of interaction continues, with the other players interacting to develop yet another collaborative pattern.

As Pat Campbell argued in her studies of children's musical cultures (1998), all children learn musical practices by being informally socialized into a community of practice, their peer culture. The Beatbugs support a kind of musical education that is fundamentally collaborative and emergent. It taps into children's natural ability to improvise in social groups (Sawyer, 1997). Sociocultural approaches suggest that the goal of musical educators should be to create musical communities of practice, rather than to transmit musical knowledge. In this way, children are socialized into collective musical practices.

When teachers create these musical communities, they should keep in mind that learners need more structure than experts. These structures have been called *scaffolds* and the educational practice is known as *guided participation*. For example, when the Beatbugs are in 'snake' mode, the children's improvised interactions occur within a strictly specified structure, one that is enforced by the computer software. Unfortunately, many educators have the mistaken belief that scaffolding means that the teacher supports the child during their learning. It's not the teacher that scaffolds the child; it's the collective practice, the activity itself (the enactment of which must be skillfully facilitated by the teacher, of course).

Learning in musical communities of practice corresponds to the way that children naturally learn in family and peer settings. Children learn music through family musical practices, through informal playground games and rhymes. Jacques Dalcroze first had the insight that learning music should be like learning your native language, an idea also advocated by Suzuki. These educators shared the insight that musical learning works best when educators create musical communities of practice that allow children to learn by participating.

Effective group activities provide for different levels of participation, to accommodate different learning styles and different developmental levels.

Each child appropriates the collective practice at his or her own pace, and to a different degree. And effective group activities provide for easy movement from peripheral participation to a more central role (Lave and Wenger, 1991). An effective group activity, from the community of practice perspective, allows all learners to participate meaningfully regardless of their level; and it is structured so that each level of participation naturally propels the child to increasing appropriation, mastery and central participation.

In such classrooms, students learn more than the mechanics of music. They learn interactional skills; they learn how to listen and to respond appropriately; they learn to collaborate; they learn to communicate in social contexts. In these collective improvisational activities, children may learn a deeper musical understanding than they would from structured activities. This sort of improvisational learning is even more important in the early years. In my studies of preschool play (1997), I found that between the ages of 3 and 5, children are learning to improvise through communication, negotiation and collaboration.

Children learn best in collaborative, creative classrooms (Sawyer, 2004a). Creative and improvisational teaching is an effective tool for collaborative and constructivist learning of any content (Sawyer, 2004a, 2004b). The teacher leads the classroom in group improvisations, rather than acting as a solo 'performer' in front of the class 'audience'. Students become socialized into classroom communities of practice, in which the whole class collaborates in each student's learning.

I started out talking about group creativity, and I ended up advocating a sociocultural approach to music education. The sociocultural approach requires a reconceptualization of the goals of music education. The classroom is no longer considered the site for the transmission of musical knowledge, but rather a place where children are socialized into musical communities of practice.

Conclusion

The study of musical collaboration can provide insights into the study of all group creativity. To make this case, I gave examples of both music and theater group improvisations and I identified the shared characteristics of both types of group creativity. These characteristics are found in all collaboration: in classroom group discussion, in creative domains including art and science and in creative work teams.

The study of other forms of group creativity can help us to understand musical interaction. Concepts that were developed to analyze improvised dialogues – such as formulaic speech and indexicality – can be applied to musical communication. We should be looking into studies of group creativity, in psychology and in sociology, for ideas, examples, insights and guiding frameworks.

Musical collaboration can help us to understand all collaboration. Other scholars who study group creativity can learn a lot from what we know about group creativity in musical groups. And education researchers who are interested in how children learn from participating in communities of practice could gain insights from our knowledge of how children become socialized into communities of musical practice.

Musical collaboration provides us with a way of better understanding the essence of group creativity.

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