Descriptions of improvisational thinking by developing jazz improvisers

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Abstract
Research investigating improvisational skill development in adolescent learners is scant. In this study interviews with developing jazz improvisers are used to characterize the skill-building process. The findings were considered in light of two views of skill learning. In one view, students progress through several discrete levels, while in a different view students think like experts throughout development although the contextual demands vary. The six participants first improvised over a common 12-measure progression and then discussed their thinking in an interview that referenced their performance through approximate notation and audio recordings of their improvisation. Previous research with artist-level improvisers was used to develop an a priori coding frame to investigate to what extent the current participants described thinking that resembled that of experts. Results indicate that all six participants used monitoring and evaluation processes independent of skill level. However, only three participants with multiple years of jazz improvisation experience discussed how the underlying chord structure shaped their output. Also, experience level influenced the extent of planning during the improvisations, with novices thinking ahead a couple of notes while more experienced participants formulated plans for upcoming phrases and choruses. Pedagogical implications for improvisation in other music education settings are discussed.

Keywords
adolescents, cognition, improvisation, jazz, learning stages

The teaching of any skill should consider the related thinking processes of the learner. Despite the fact that improvisation has been part of the national standards for music education since 1994 (Consortium of National Arts Education Associations, 1994), teachers find it difficult to integrate improvisation into the curriculum, especially in traditional band, choir, and orchestra settings.
A clear understanding of developmental processes underlying skill development in musical improvisation could help teachers to better design exercises tailored to students’ experience level. One prominent theoretical framework contends that musical improvisers progress through seven distinct stages during which their thinking fundamentally changes (Kratus, 1991, 1996). Another view focuses less on discrete stages and proposes the general idea that students on all levels should learn to think like experts (Bruner, 1977). According to this idea, improvisers’ thinking should be consistent throughout development although the contextual demands will necessarily vary.

Kratus (1991, 1996) suggested that improvisers pass through seven different stages. In the initial exploratory stage, students develop connections between motor movements and the sounds they produce on an instrument. Moving to the process-oriented stage, occasional melodic patterns emerge within students’ improvisations, showing their thinking is becoming more intentional; patterns are increasingly being stored in working memory for later use. Yet, student focus is still on the process of improvisation without considering the audience. In the product-oriented stage that follows, students become aware of their role in a larger context and begin to shape their improvisations according to what they hear and how it is perceived. According to Kratus (1996), improvisations at this stage “begin to show such characteristics as the use of a consistent tonality or metre, the use of a steady beat, the use of phrases, or references to other musical pieces or stylistic traits.” (p. 33). By the fourth stage, fluid improvisation, students have developed enough technical skill on the instrument that their movements become more automatized. Students reaching the subsequent structural improvisation stage use a variety of strategies to shape the overall structure of their improvisations. In the sixth stage, students move to stylistic improvisation in which they develop a personal voice within a given stylistic constraint. The seventh level, personal improvisation, is rarely reached. Only artist-level performers who develop an innovative style reach this point. Students must pass the previous level to get to the next stage (Kratus, 1996). “Students cannot skip levels, but they may revert to earlier levels” (p. 36) if they are learning new styles or other novel elements. According to Kratus, each level serves as “a doorway to the next” (p. 36) and as “a foundation for later learning” (p. 36). It follows that students on the third product-oriented level would not be able to incorporate stylistic constraints and architectural strategies as they have yet to acquire the technical facility necessary to move to the fluid improvisation level.

Kratus’ model has been explored experimentally with younger students (Brophy, 2002, 2005). In a longitudinal study, participants who were initially age 7 were recorded improvising three 8-measure melodies once each year as part of a class rondo for Orff instruments using the C pentatonic scale on an alto-xylophone (Brophy, 2005). Over a three-year period the students started using more repeated melodic and rhythmic motives and antecedent/consequent phrases in their improvisations. Brophy (2005) interpreted these results in light of the Kratus model, theorizing that students moved from the process to the product-oriented stage around age 8. Importantly, Brophy suggested that students’ improvisations develop as they age even without targeted instruction in improvisation.

Other studies with younger children confirm that students’ creative abilities appear to naturally develop as they move through the early grades (Baldi & Caterina, 2002; Kiehn, 2003, 2007). Kiehn (2003) showed that students’ scores on a musical creativity test improve significantly between grades 2 and 4 but not between grades 4 and 6. The test score was based on six improvisational tasks performed on Orff instruments. Baldi & Caterina (2002) analyzed the content of longer improvisations by students in grades 2 to 5 that were performed solo in response to narrative prompts (e.g., “an old man and a child”). They found that older students’ improvisations generally showed a higher degree of organization although the organizing strategies used by the students varied.
In contrast to the studies mentioned above, investigations using a vocal improvisation task do not appear to show a correlation between improvisation achievement and age (Guilbault, 2004, 2009). Younger students have more experience using their voices than playing instruments. Therefore their vocal improvisations may be more sophisticated than the same students’ instrumental improvisations (Kratus, 1996). Though no analysis of structure within the improvisations was performed, Guilbault (2009) showed that students sang improvisations that more closely adhered to the underlying harmonic structure after instruction with harmonic accompaniment but that this effect was independent of students’ age.

Unlike Kratus’ model of discrete stages of skill development, Bruner (1977) advanced the idea that students on all levels have the capacity to behave – even in approximation – like expert practitioners. He famously wrote: “The schoolboy learning physics is a physicist, and it is easier for him to learn physics behaving like a physicist than doing something else” (p. 14). In other words, students on all levels should think and act like experts, although the contextual demands naturally differ. In the context of improvisation, therefore, students on all levels should ideally use thinking processes resembling that of experts even if the context (e.g., tempo, underlying harmony) is much simplified.

The thinking of artist-level improvisers has previously been described (Norgaard, 2011). In that study, participants first improvised on a blues melody of their choice accompanied by a drum track. They were then asked to describe their thinking while looking at and listening to the improvisation just performed. Six themes emerged from thematic analysis of the interviews. Two themes concerned ongoing processes which the author referred to as sketch planning and monitoring (Norgaard, 2011). Participants described the ongoing planning for upcoming passages of their improvisation. Typically, this planning concerned architectural features of future phrases or choruses. These included higher note density or particular register changes among other features. The ability to plan upcoming passages of improvisations has been linked to expertise (Fidlon, 2011). Fidlon interrupted improvisers with different levels of experience at various points during an improvisation and asked them to report what they were about to play. He found that compared with novices, the plans of more experienced improvisers addressed a longer span of time but contained less musical detail. The less-experienced participants were often unable to report what they were about to play, or were only able to construe the next note or group of notes they would play. It therefore appears that the range and specificity of planning may be related to expertise.

In Norgaard’s (2011) study, artist-level improvisers also described the ongoing monitoring and evaluating of their own improvisation. In one example, a participant stated, “I hear myself doing that” (p. 117), implying that he reacted to what was just played. Comments concerning monitoring often included evaluative statements. In interviews with two classically trained improvisers, Berkowitz (2010) also mentioned a monitoring process labeled the creator and witness phenomenon in which the player describes experiencing himself perform. Interestingly, the ability to self-evaluate has been linked to improvisational achievement in college-age instrumental students (May, 2003).

In addition to the two ongoing processes, Norgaard (2011) identified four generative strategies used selectively to describe how improvised material was created: idea bank, harmonic priority, melodic priority, and repetition. Often participants outlined how particular material was derived from an internal bank of ideas and strategies. Jazz musicians often describe the process of learning as similar to acquiring a vocabulary of such ideas (Berliner, 1994). Indeed, analysis of transcriptions of historical jazz solos reveals a large number of repeated patterns (Finkelman, 1997; Kerry, 1999; Owens, 1974, 1996) and inserting stored motor patterns has been suggested as a fundamental process in improvisation (Norgaard, 2014; Pressing, 1988). At other times, participants described simply creating improvised lines according to the underlying chord structure using a strategy.
labeled harmonic priority. Following this strategy, improvisers can use tonal rules to guide the development of an improvised line (Johnson-Laird, 2002). Similarly, though less often, participants described using melodic rules to create improvised lines that had a logical horizontal consistency although it did not necessarily reflect the underlying chord changes. Finally, participants described using repetition as material played earlier in the improvisation was reused at a later time.

The current study investigated to what extent developing jazz improvisers aged 12–17 use the same processes described by artist-level improvisers (Norgaard, 2011). Some research exists exploring improvisation with middle and high school students with a focus on interaction (Burnard, 2002), differences in children’s perceived experience of improvisation and composition (Burnard, 1999), and peer-mentoring (Goodrich, 2007). This study specifically explored developmental processes with students learning to improvise in the jazz tradition. Using a methodology similar to Norgaard (2011), participants in the current study improvised on the 12-bar blues and were then asked to describe their thinking while looking at the notation and listening to the recording of an improvisation just performed. Each participant represents a snapshot of thinking on a particular level of improvisational mastery.

The research questions that guided this study were:

(1) To what extent do developing improvisers describe thinking that resembles that of artist-level improvisers as described by Norgaard (2011)?
(2) Is the use of advanced thinking by developing improvisers related to their level of experience?
(3) Which elements of advanced thinking (planning, monitoring, bank of ideas, harmonic or melodic focus, repetition) do developing improvisers describe using?

**Method**

**Participants**

Six improvisers aged 12–17, including one female, participated in the study. Two were middle school students and four were high school students. Table 1 lists each subject’s age, instrument, and self-reported experience level on their main instrument and with jazz improvisation. The subjects are listed in order according to the number of years of experience improvising in jazz style. Pseudonyms are used throughout this article to protect the anonymity of the subjects. The students were recruited from a university-sponsored after-school program in which students from area jazz bands participate in jazz ensembles led by university jazz faculty members. Entrance to the program is determined by audition or other selection criteria administered by the school band director in collaboration with university faculty. As participation in this program is optional and requires a large time commitment, all subjects in the study were committed to learning jazz and improvisation, though the level of experience among them varied. Participating in this study required consent from the students and their parents/guardians; therefore, participation was voluntary. Although care was taken to represent various ages and levels of experience, it was not possible for the sample to include all instrument groups (e.g., brass is not represented) or to balance gender. The study protocol was approved by the university’s Institutional Review Board.

**Materials and procedure**

The procedure for conducting the interviews was similar to a previous interview study conducted with artist-level improvisers (Norgaard, 2011). Each session consisted of the performance of an
improvised jazz solo followed by an interview. Participants played a solo based on the 12-bar blues form along with a recorded accompaniment track that consisted of piano, bass, and drums (Hill, 1999). In order to ensure a consistent tempo (187 beats per minute) and to allow improvisers to play as long as desired, two choruses from the original accompaniment track were excerpted and looped. Prior to the performance, the following script was read to the participant:

Play an improvised solo on a blues in F major along with the CD accompaniment. You may start with a melody that is very familiar or go directly to the improvisation. Play long enough that you feel the performance makes sense. In other words, go until you feel like you can finish. You don’t have to decide the exact length beforehand.

The performances were recorded using digital recording software (Tost, 2007), which was also used to play back the accompaniment track. When the participants terminated their improvisation, the track was simply stopped. Immediately after, the audio track was converted to midi using different software (Melodyne Assistant, 2011) and then the midi file was imported back into the audio software. This allowed for approximate notation based on the midi file to display on a computer monitor while participants heard the original audio. Pianists’ performances were recorded directly from a digital piano’s midi output, eliminating the conversion step.

After the performance, the participant was asked to comment on the solo just performed while looking at the approximate notation and listening to the original audio. The researcher played the entire solo in short excerpts and asked questions such as “where did that come from?” and “why did you play that?” The length of the excerpts was selected to fit phrase boundaries as determined by both the interviewer and the interviewee. This method of responsive interviewing involves themes introduced by the interviewee and allows the interviewer to ask related follow-up questions (Rubin & Rubin, 2005).

Table 1. Participants.

<table>
<thead>
<tr>
<th>Name</th>
<th>Instrument</th>
<th>Age</th>
<th># of years on main instrument</th>
<th># of years improvised jazz</th>
<th>Comments background &amp; influences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liz</td>
<td>Piano</td>
<td>13</td>
<td>8</td>
<td>.67</td>
<td>No improvisation in private piano lessons, only in jazz band/combo settings.</td>
</tr>
<tr>
<td>Mike</td>
<td>Flute</td>
<td>12</td>
<td>4</td>
<td>.75</td>
<td>Learned to improvise in jazz band/combo settings.</td>
</tr>
<tr>
<td>Joe</td>
<td>Tenor Sax</td>
<td>16</td>
<td>6</td>
<td>3.5</td>
<td>Improvisation experience “noodling” since he started and “structured… 3 or 4 years ago” in school jazz band and a combo “that plays around town.” Major influences: Benny Golson, Lester Young, Charlie Parker.</td>
</tr>
<tr>
<td>Pete</td>
<td>Alto Sax</td>
<td>16</td>
<td>7</td>
<td>4</td>
<td>Main influences: Cannonball Adderley, Charlie Parker, Phil Woods, John Coltrane, Miles Davis.</td>
</tr>
<tr>
<td>Greg</td>
<td>Piano</td>
<td>17</td>
<td>13</td>
<td>4</td>
<td>Started classical lessons at age 4, now takes jazz piano lessons with university level teacher.</td>
</tr>
<tr>
<td>Roger</td>
<td>Tenor Sax</td>
<td>14</td>
<td>8</td>
<td>8</td>
<td>Started on alto, switched to tenor “two years ago.” Major influences John Coltrane, Wayne Shorter, Cannonball Adderley, Chris Potter.</td>
</tr>
</tbody>
</table>
Data analysis

Each interview was transcribed and analyzed using Qualitative Content Analysis (QCA). QCA allows for the interpretation of qualitative data using a concept-driven coding frame (Schreier, 2012). This approach is useful for investigating specific research questions by developing an a priori coding frame in which all subcategories within a category are mutually exclusive.

In order to answer the three research questions, a concept-driven coding frame was developed based on the thinking of expert improvisers as previously described (Norgaard, 2011). To assess the extent to which the developing improvisers may have planned upcoming parts of their improvisation, the coding category Planning was created along with subcategories reflecting various levels of organization (see Table 2). To assess whether participants monitored and evaluated their improvised output as they played, the coding category Monitoring was created with subcategories related to the type of evaluation (positive, negative, or no evaluation).

The generative strategies used by the developing improvisers were investigated by adding the categories Bank and Procedure. Responses in the Bank category were assigned to one of three subcategories: previously learned ideas or strategies (Library); material used previously in the same improvisation (Current Improvisation), or material related to the stated blues melody played prior to the improvisation (Melody). The Procedure category was created for comments that related to a specific focus expressed by the improviser. If comments related to a linear/melodic focus, comments were coded with the Procedure: Melodic code. If the participant described relating to underlying harmonic structures implied in the blues form, the comment was coded with Procedure: Harmonic. If rhythm appeared to be the focus, the code Procedure: Rhythmic was used, and if the participant clearly described focusing on several of these elements concurrently, the code Procedure: Combination was used.

The concept-driven part of the coding frame was initially developed and then pilot tested through the independent coding of one interview by two coders. The coders were the researcher and a collaborator with no prior knowledge of the interviews. The collaborator had extensive experience in music and psychology. We compared results and discussed which categories and subcategories needed revision and clarification. We also discussed the method of segmentation of the material. Each segment consisted of all verbalizations related to a particular piece of improvised material since “you need a large unit of coding that comprises everything a person says on that topic” (Schreier, 2012, p. 144).

After the development of the coding frame, all interviews were coded again by both the researcher and the collaborator independently. After each interview was coded, we discussed any discrepancies and updated the coding accordingly. This procedure assured consistency in coding and serves to assure reliability (Schreier, 2012). In order to capture the meaning of comments not related to the research questions, QCA allows for the development of data-driven codes during analysis (Schreier, 2012; Strauss & Corbin, 1998). This data-driven part of the coding frame only yields anecdotal data and the number of occurrences of codes within this category is therefore not reported.

Results

A total of 40 codes, 14 concept-driven and 26 data-driven, were assigned one or more times to 173 quotations in the six interviews resulting in a total of 429 code assignments. A total of 24,397 words were analyzed. The main analysis focuses on the 14 concept-driven codes derived from the research questions assigned a total of 335 times (see Table 2). These codes reflect the participants descriptions related to thinking that resembles that of artist-level improvisers as described in previous
research (Norgaard, 2011). Related to the first research question listed above, all participants described using strategies and material they had learned previously, as indicated by the 53 instances of the Bank: Library code (range 3–15). Every participant also described repeating material or relating to material played earlier in the same improvisation (total number of Bank: Current improvisation codes: 25, range 1–8). Furthermore, all participants described monitoring and evaluating what they had just performed (total number of Monitoring codes: 48).

Concerning the second research question, the four more experienced improvisers planned their improvisation to a greater extent than the two less experienced, as reflected in a higher number of Chorus-level Plan codes within the Planning category. For these musicians, it appears that the level of planning is experience dependent. In addition, the two less experienced improvisers described an exclusive focus on the melodic aspect of their improvisation without relating to the underlying chord progression as evidenced by the number of Melodic compared to Harmonic codes within the Procedure category. In contrast, the more advanced players discussed relating their improvised line to the harmonic progression more often. The more advanced participants therefore seemed to have a fundamentally different focus concentrating on the underlying harmony whereas the lesser experienced participants focused on the horizontal line. To further explain these trends and to answer the third research question, each participant is individually discussed beginning with the least experienced (see Table 1).

Liz, who had only 8 months of improvisation experience, described selecting notes from the F blues scale without consciously attending to the underlying chord structure and without an overall plan. She described playing from F to the F an octave up stopping on selected notes: “I do that a lot, I think I go up and down between the octaves.” She made evaluative statements about which notes she used: “It was simple but then it sounded good with the E-flat.” Her improvisation was guided by the learned scale (the F blues scale) and by the knowledge that going up and down the scale produces an acceptable improvisation. A couple of times, she surprised herself by playing melodic figures that she really liked and commented at one point, “[the figure] sounds like one of the blues licks we play in jazz band.”

Table 2. Concept codes per participant.

<table>
<thead>
<tr>
<th>Concept codes per participant</th>
<th>Liz</th>
<th>Mike</th>
<th>Joe</th>
<th>Pete</th>
<th>Greg</th>
<th>Roger</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning: Note-level plan</td>
<td>5</td>
<td>11</td>
<td>2</td>
<td>4</td>
<td>9</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>Planning: Phrase-level plan</td>
<td>1</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Planning: Chorus-level plan</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Planning: No plan</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Monitoring: Evaluation positive</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>Monitoring: Evaluation negative</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>Monitoring: No evaluation</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>17</td>
</tr>
<tr>
<td>Bank: Current Improvisation</td>
<td>1</td>
<td>6</td>
<td>3</td>
<td>1</td>
<td>8</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Bank: Library</td>
<td>9</td>
<td>10</td>
<td>15</td>
<td>5</td>
<td>11</td>
<td>3</td>
<td>53</td>
</tr>
<tr>
<td>Bank: Melody</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>Procedure: Combination</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Procedure: Harmonic</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>13</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Procedure: Melodic</td>
<td>12</td>
<td>22</td>
<td>13</td>
<td>12</td>
<td>8</td>
<td>5</td>
<td>72</td>
</tr>
<tr>
<td>Procedure: Rhythmic</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>7</td>
</tr>
</tbody>
</table>
Mike, with similar experience level to Liz, also described not being aware of the current place in the blues form during improvisation and not considering the underlying harmony. No quotes from the interviews with Mike and Liz were assigned the Procedure: Harmonic code. However, unlike Liz, he did describe planning on the phrase level as reflected by more Planning: Phrase level codes. Explaining how he repeated a figure up a step, he stated, “When I played [sings line] the first time, I thought ‘it sounds cool’ so I decided I would go up one step in the major scale, in the F concert scale… first time I played, I started with the F, next time I probably started with the G” (see Figure S1 in online Supplementary Material). He also described being aware of the contour of his improvised melody, such as in this account: “You know… when I was playing the other one, it went up then kind of went down and kind of made a mountain. And this one I just came down.” These comments suggest that Mike may be aware of slightly larger structures as compared to Liz’s focus on individual notes.

Joe, who had over three years of experience improvising jazz, said he was aware of the underlying harmonic form though his descriptions appear to have more of a horizontal focus. He described more advanced uses of melodic material derived from the tonic F major independent of the underlying chord structure. For example, outlining how he used chromatic approach notes to the chord tones, he explained a passage as “just circling the root and the seventh [of the F major chord]” though the underlying chord was the G minor seventh in the ninth bar of the blues progression. Different from Mike and Liz, Joe spoke several times about elements related to a larger plan reflected in the higher number of Planning: Chorus-level codes. Concerning the sparse texture in the beginning of the solo, he explained that he likes to leave a lot of space in the beginning of his solos. He also mentioned that earlier in the solo he leaves space between choruses while later he plays across those section boundaries.

In Pete’s solo, the underlying chord progression is more clearly outlined as compared to the solos described above. Although the code counts still point to a stronger focus on the melodic aspect of the improvisation, four comments were coded with the Procedure: Harmonic code. In one example Pete explained: “I like to emphasize the change, the A to the A-flat in the fourth [fifth] bar when it goes down a half step.” However, when asked whether he was aware of the theoretical implication of this change he said “sort of” and explained he just liked the sound. Similarly, he denied knowing why he played the leading tone on the dominant chord in a later chorus.

The two most advanced players, Greg and Roger, seemed more aware of the link between the improvised line and the harmonic accompaniment. For both Greg and Roger, more comments were coded with the Procedure: Harmonic than Procedure: Melodic code. Greg also displayed a clear understanding of the theory underlying tonal improvisation. Asked to talk about a four-measure phrase, Greg replied, “I just did an altered VI chord then to the minor ii.” In another example he explained: “that’s my ii-V-I to the IV chord. That’d be [arpeggiating] the Cm7 … and then I’m coming down sharp 9 flat 9” (see Figure S2 in Supplementary Material). Yet, despite a clear awareness of the underlying theory, things still happened during Greg’s solo that he described as unplanned.

Roger, the participant with the most jazz improvisation experience, asserted that he knew the theoretical implications but that he was concerned with the “amount of feeling” while improvising. For example when asked whether he knew the function of the B-flat he played on the G minor chord in the ninth bar of the blues progression, Roger replied, “I knew that, but I wasn’t thinking about it during my solo.” Concerning phrase structure, he explained his thinking as related to higher level architectural elements like register and note density. Talking about a long ascending eighth note line, he said: “It’s just like what I was feeling at the time … I was thinking like moving on instead of staying in the lower register.” At another point Roger explained his note choices in terms of energy: “I was thinking about that build up, and like to play like a little bit more acrobatic
stuff.” He also talked about going “in and out of chord changes,” commenting on a harmonically advanced eighth note passage. Concerning the overall plan for the solo, Roger explained:

[in] the beginning of my solo I played less notes, like I was being like relaxed with it, and like just focusing on the way it feels and stuff and towards the end like I played a little bit more notes and like experimented some with some of the stuff that I played.

Interestingly, despite producing a solo that clearly reflected the underlying chord progression, Roger rarely mentioned the harmonic implications of his note choices.

Discussion

This study investigated to what extent developing improvisers think like artist-level jazz musicians and whether they meet criteria for various discrete stages of skill development. In interviews, six jazz students of different ages and experience levels described their thinking while looking and listening to an improvisation they had just performed. Their verbalizations were transcribed and analyzed using a coding frame developed from previous research describing the thinking of artist-level improvisers (Norgaard, 2011).

The results suggest that students of tonal jazz improvisation may indeed progress through two learning stages, initially focusing exclusively on the melodic elements of improvisation and only later relating the melodic line to the underlying chord structure. The descriptions of the two least experienced students were focused nearly exclusively on melodic aspects of their improvisations, saying they were not thinking or aware of the underlying chords, or notes or figures that related to the chords. This is in contrast to the two most advanced students who described knowing their place in the form and often played melodic lines that clearly reflected the accompanying chords. This would suggest two stages, *diatonic* and *harmonic* improvisation. During the diatonic stage, students are exclusively focused on creating melodies without regard to the underlying chord structure. In the second harmonic improvisation stage, students are able to keep their place in the form allowing the underlying chords to shape improvisational choices.

The general notion of stages aligns with the theoretical framework suggested by Kratus (1991, 1996), although the features of tracking and chord emphasis may be specific to jazz improvisation. The current participants’ descriptions of their thinking do not appear to fit the stages described by Kratus. For example, while Liz did not appear to have reached the fourth *fluid improvisation* stage, many of her figures clearly reflected a stylistic awareness that according to Kratus does not emerge until the sixth level. Also, all participants except Liz described being aware of structural elements which would place them on the fifth level or above in Kratus’ sequence. Yet, using the diatonic–harmonic distinction, Mike is clearly not as advanced as Greg and Roger. It may be that Kratus’ model is less suited to describe improvisational skill development in middle and high school jazz students as opposed to students in general music classes learning to improvise outside stylistic conventions.

Concerning the level of planning, it did appear that the two less experienced improvisers in the current study were largely focusing on note-to-note decisions; the more advanced improvisers, on the other hand, appeared to have an overall plan that shaped each chorus in the solo. The code counts for the Planning category listed in Table 2 show the two least experienced players generally described thinking only a couple of notes ahead as reflected by the number of comments coded with the Note-level plan compared to the Chorus-level plan. This trend is in contrast with the descriptions by Roger, the most advanced player, who spoke often about approaching his improvisation with a larger architectural plan. This aligns with the general skill learning literature.
indicating that choices become more automatized with increased experience (for a review, see Schmidt & Lee, 2011). It also aligns with the general trend underlying Kratus’ sequence (1991, 1996) in which increasingly automatized movements allow students to focus on structural concerns as they reach more advanced stages. One possible exception to this trend is Greg, whose comments were more often coded with Note-level than Chorus-level plan despite his extensive instrumental and improvisation experience. This may be due to his advanced theory knowledge as reflected in his precise descriptions of tonal function in shorter passages (see Figure S2 in Supplementary Material). During the interview, he may have focused on explaining these smaller structures independent of his thinking during performance.

The results also indicate that the thinking of developing improvisers on all levels resembles that of artist-level musicians in several important ways, aligning with the Bruner (1977) perspective discussed in the introduction. All the improvisers in the current study described planning ahead on some level and monitoring and evaluating what they had just played. In one example, Mike, one of the least advanced participants, said, “I wasn’t able to get what I was trying to play out correctly, so the eighth notes came out wrong.” His comments imply that after planning and implementation he used a retrospective monitoring process to evaluate what he just played. Similarly, the most advanced participant commented on a missed note by saying: “I messed up right there. That’s why I went back and played it again.” Descriptions of retrospective monitoring were also reported by artist-level improvisers in a previous study, including one who stated: “I got there too soon or sooner than I would have liked, so you have to be a helicopter and kind of hover around. I had to fix that, whatever that is” (Norgaard, 2011, p. 117).

Also independent of jazz experience, all improvisers in the current study described deriving material from a bank of ideas. Liz used the Blues Scale, and Roger described inserting “Chris Potter stuff,” a reference to material he learned by listening to recordings by the modern saxophonist. Though the techniques of using a learned scale from which to pick notes independent of the choral context and the insertion of harmonically advanced patterns require very different levels of skill, the underlying concept of using material from a bank of ideas is similar. This fits well with the theoretical framework suggested by Bruner (1977), which asserts that the fundamental thinking of learners on all levels should resemble that of experts, although the contextual demands will necessarily vary. In the current study, participants on all levels inserted previously learned material into the ongoing improvisation as evidenced by comments coded with Bank: Library and described planning and monitoring processes.

The less experienced improvisers in the current study were clearly engaged in the process of improvisation and had clear ideas of successful and less successful note choices despite only using one scale and not consciously tracking the place in the underlying chord structure. This would suggest the value of easy exercises for students new to improvisation. For example, instructors of large ensemble classes could introduce students to improvisation using a chord accompaniment in which one scale works throughout. The instructor could design exercises that demonstrate the planning concept by asking students to build solos that gradually ascend in pitch and later descend. The current research suggests that novice improvisers monitor and evaluate their output in real time, as they play. The instructor could set various evaluation parameters such as whether the students used the correct scale, followed the rhythmic feel of the accompaniment, or outlined an architectural structure. It seems crucial to design exercises that only require students to be on the melodic stage before forcing them to imply underlying harmony. A premature introduction to the harmonic stage could inhibit the development of planning and monitoring processes that mirror the thinking of artist-level practitioners by compelling students to think theoretically in order to fit the improvised output to a harmonic accompaniment. Indeed current improvisational pedagogy has been criticized for focusing exclusively on theoretical concepts at the expense of developing musicality (Sarath, 2002).
The learning process of students immersed in the jazz tradition may differ from students without prior exposure. Concerning learning to improvise, Roger asserted he “learned from listening” because he “never had a teacher.” Extensive listening may allow jazz students to partially bypass conscious study of the rules related to harmonic improvisation (Norgaard, 2014; Norgaard, Spencer, & Montiel, 2013). It could be that students immersed in the jazz tradition learn a large vocabulary of patterns similar to the way young kids learn language using statistical learning processes (for a review, see Saffran, 2003). Following this line of thinking, it may be that Roger was unaware of some of the theoretical implications of his improvisation but was unwilling to acknowledge this in the interview. It is also possible that Roger learned the theoretical implications of some of his commonly used melodic patterns after he already had incorporated these patterns in his vocabulary.

It is important to note that we cannot assume from this cross-sectional sample that each student did or will progress from the melodic to the harmonic stage. A longitudinal study that follows beginning jazz students could investigate if they indeed progress from a melodic to a harmonic focus. Future research could also investigate the role of different instructional methodologies used by developing jazz improvisers and their instructors. Another limitation of the current study is the reliance on retrospective verbal information. Obviously these descriptions of thinking may not reflect the actual thinking of developing improvisers. Experimental studies could help elucidate this thinking (Goldman, 2013). Furthermore, the current article refers to improvisations that more or less imply the underlying harmonic progression. This observation could be quantified through a more formal analysis of the solos including an actual count of chord and non-chord tones. Finally, the code counts listed in Table 2 should be interpreted with appropriate caution due to the low sample size and possible subjectivity of the categorization process. However, this sample size is common in qualitative research and two researchers independently coded each interview and then discussed and resolved discrepancies. Future research of developmental processes in improvisation should include a larger sample size in which gender is more balanced and multiple styles are represented. In particular, the sole female in the current study happened to be the least experienced participant. In future research, care should be taken to recruit a balanced gender sample representing all experience levels.

In summary, the current study showed that jazz students on various levels described thinking processes that mirror descriptions by artist-level improvisers including planning and monitoring processes. Yet, the improvisers in the current study could be clearly differentiated according to their ability to track the underlying chord structure and imply this structure in their improvisations. It therefore appears the two theoretical frameworks by Bruner (1977) and Kratus (1996) may apply as complementary views of improvisational skill development in the current sample. This differentiation between thinking processes that apply to all levels, and processes that are specific to particular learning stages, may help inform pedagogy for teaching improvisation in any setting.

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**References**


