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What Makes a Good Musical Improviser? An Expert View on Improvisational Expertise

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This study presents an expert view on musical improvisational expertise. A group concept mapping procedure was used to identify key characteristics of such expertise among a group of 26 renowned musical experts. Multivariate analyses, including 2-dimensional multidimensional scaling (MDS) of unstructured sort data, hierarchical cluster analysis of the MDS coordinates, and the computation of average ratings of 169 statements resulted in a 7-cluster concept map. The cluster self-regulation was located at the heart of the cluster map and was, therefore, regarded a core constituent of improvisational expertise. The other clusters were basic (musical) skills, affect, risk-taking, creation, responsivity, and ideal. Implications for instruction, limitations of the study, and future research are commented on.

Keywords: improvisation, expertise, concept mapping, music, jazz, instruction

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Creativity in the musical domain amounts to the generation of music, which includes both composition-based and performance-based modes of expression (Deliège & Wiggins, 2006; Hargreaves, MacDonald, & Miell, 2012). Belonging to the latter category, musical improvisation signifies the real-time instance of music making when musical parameters like pitch, timbre, order, and density of notes are not specified in advance. As such, it contrasts with forms of musical performance closely related to imitation in which generation and expression are largely prescribed (Clarke, 2005; Palmer, 1997; Sloboda, 1996, 2000). Improvisation is universal, ingrained in various old and new musical cultures. It even cuts across cultures, being a driving force for musical evolution (MacDonald, Wilson, & Miell, 2012). Besides this cultural function, improvisation serves as an important expedient for individual musical development. For musicians belonging to musical cultures where improvisation is the backbone of music making, this is self-evident. But also musicians extraneous to such traditions who mainly perform pieces of written music benefit from a certain expertise in improvisation, as research shows that the act of improvising music adds to deep understanding of musical rules and structures, personal expressivity, and creativity in music and beyond (Koutsoupidou & Hargreaves, 2009; Lewis & Lovatt, 2013; McPherson, 1993). The significance of improvisation for both individual (musical) development and (cross-)cultural musical evolution explains the growing demand for an attentional focus on improvisational skill learning in music education and successive professional practice (cf. McPherson, Davidson, & Faulkner, 2012; Sawyer, 2007; Smilde, 2012).

An increased interest in improvisational expertise raises the question what it exactly entails. This question is particularly relevant as improvisational expertise is subject to change due to the evolutional nature of improvisational practice. Changing expertise warrants a recurrent analysis, which is most informative for musical instructors and (lifelong) learners to design and redesign both instructional and learning activities (Fidlon, 2011). The present study contains such an analysis and provides a contemporary view on improvisational expertise that can be characterized as expert, holistic, and domain-specific (cf. Hoffman & Lintern, 2006). Before elaborating on the research goal of the study and existing literature related to improvisational expertise, these three characteristics will be briefly explained.

This study invited experts with an extensive track record to reveal improvisational expertise. Asking renowned experts to scrutinize their expertise is not as self-evident as it seems. Chi (2006), for instance, contends that experts often have problems articulating their expert knowledge, as it is predominantly tacit. However, Hoffman and Lintern (2006, p. 216) refute this "hangover issue from the heyday of Behaviorism" and illustrate that various techniques contribute positively to the elicitation of expert knowledge, including the tacit components. The present study used Trochim's (1989) *group concept mapping* (GCM) to educe expert knowledge on improvisational expertise, a method also referred to as *expert concept mapping* (Stoyanov & Kirschner, 2004). GCM is a mixed

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method that applies (a) structured (group) activities for data collection and (b) multivariate statistical methods for data analysis to produce a graphical representation of a domain of ideas that signifies a "collective" knowledge base of a group of experts.

"Holistic" refers to three issues. First, it means that improvisational expertise is looked at from different angles, resulting in complementary views on the topic that ultimately fuse into one comprehensive view on expertise. For the present study this was established by means of consulting a variety of actors in the field of musical improvisation, namely musicians, teachers, critics, and researchers (cf. Csikszentmihalyi & Rich, 1997). Second, holistic indicates that the scope of the analysis is wide-ranged and extends the prevailing cognitive focus in improvisation research. As such it aims at revealing conative, affective, and motor attributes of improvisational proficiency as well (cf. Ackerman & Beier, 2006). Third, holistic means that the system of interest for the analysis covers the improvising musician acting in a professional context (e.g., a community of practice; Barrett, 1998; Wenger, 1998), rather than the individual performer who creates music in isolation. Professional improvisational tasks are normally situated in a rich and dynamic context, and therefore it is important to include this context in the system of analysis.

Besides "expert" and "holistic" the view on improvisational expertise in this study can be characterized as "domain-specific." The domain of jazz music was selected as research context because improvisation is the hallmark of jazz (Berliner, 1994). Because there is a perpetual controversy regarding the definition of jazz (Ake, Garrett, & Goldmark, 2012; Gridley, Maxham, & Hoff, 1989), a broad conception was chosen to select participants for the study. As a result, the group of participants included experts with knowledge on improvisation in jazz music that covers the spectrum from traditional "idiomatic" subgenres to more eclectic and "freer" ones.

Improvisation is complex human behavior, which is aptly expressed by Pressing (1998, p. 51) who states that "the improviser must effect real-time sensory and perceptual coding, optimal attention allocation, event interpretation, decision-making, prediction (of the actions of others), memory storage and recall, error correction, and movement control, and further must integrate these processes into an optimally seamless set of musical statements that reflect both a personal perspective on musical organization and a capacity to affect listeners." This description illustrates that improvisation consists in a complex of mental and motor processes that altogether heavily challenge the human system. Further, it articulates that a certain degree of proficiency is necessary to meet this challenge, which is emphasized by the two performance criteria mentioned by Pressing, namely a *personal perspective* and a *capacity to affect listeners*. A personal perspective or *personal voice* corresponds to high levels of improvisational expertise (Bailey, 1992; Kratus, 1991; McMillan, 1999; Sudnow, 1978) and strongly relates to *originality*, one of two defining features of *creativity* (Runco & Jaeger, 2012). For that matter, the other feature is *effectiveness*, which might be connected to a capacity to affect listeners. Finally, Pressing's description of improvisation touches the conscious–unconscious dichotomy that characterizes thinking in the course of improvisational action (cf. Baumeister, Schmeichel, DeWall, & Vohs, 2007; Dietrich, 2004; Limb & Braun, 2008; Liu et al., 2012; Sawyer, 1992). In a footnote that corresponds to the element "attention" in the description above, Pressing connects this concept with selective activation and deactivation of particular brain structures. Interestingly, recent studies that used functional MRI (fMRI) to reveal the neural correlates of expert improvisation, found evidence of altered states of consciousness. Limb and Braun (2008) for instance observed a decrease in neural activity in areas of the prefrontal cortex in expert improvising jazz musicians. This finding indicates that expert improvisers "experience" transcendent states of consciousness, a result that can be related to concepts like *flow* or *peak experience* (cf. Csikszentmihalyi & Rich, 1997; Maslow, 1968). A study of Berkowitz and Ansari (2010) detected deactivations in another brain area (i.e., the right temporoparietal function), which might indicate a focused attentional state when experts improvise. It should be remarked that results of these fMRI studies should be interpreted with care (see Dietrich and Kanso [2010] and Sawyer [2011] for discussions on methodologies of cognitive neuroscience).

Although improvisation is an activity everyone can engage in at some level (Kratus, 1991; MacDonald et al., 2012), it is the expert improviser who can create something that is both comprehensible and interesting for a larger audience. Contrary to novices or laypersons, expert improvisers manage to maintain themselves within the scene of constraint that defines the improvisational act. They have been adapted maximally to the constraints related to task performance (cf. Ericsson & Lehmann, 1996; Gruber, Jansen, Marienhagen, & Altenmueller, 2010; Lehmann & Gruber, 2006), which means in the case of improvisation they have the resources to circumvent (and affect) internally (i.e., psychologically and physiologically) and externally (i.e., socioculturally) imposed constraints (Berkowitz, 2010; Johnson-Laird, 1988; Kenny & Gellrich, 2002). The *internal constraints* relate to different systems of the human body that collectively form the "hard- and software" of the human system (cf. Charness, Tuffiash, & Jastrzembski, 2004). Although most of the bodily systems are active when improvising, it is especially the musculoskeletal system (i.e., muscles for playing an instrument), the respiratory system (i.e., lungs for singing and playing a wind instrument), and the nervous system (i.e., senses and memory for action, control, storage, and reflection) a musician uses to produce good-quality improvisations. Research shows that these three "hardware" systems change as musical expertise develops, indicating neural and physiological plasticity (Gruber et al., 2010; Lehmann & Gruber, 2006). An important internal constraining "piece of hardware" of the human system is working memory (WM; Baddeley, 1992, 2012; Charness et al., 2004). WM is necessary for maintaining and manipulating information while performing a task. Because of its limiting processing capacity (cf. Miller, 1956), WM is the bottleneck in real-time music making. Johnson-Laird (2002), for instance, emphasizes this limitation in his computational theory of improvisation, which specifies no WM for intermediate results when melodies are being generated. The theory says that the creation of melodies relies on rules and information that are stored in long-term memory. As a result, WM capacity can be used for keeping track in the overall musical sequence and registering what other musicians are playing. This monitoring function of WM relates to the aforementioned altered states of consciousness that features improvisation and includes activities like musical planning and evaluation (Hargreaves, Cork, & Setton, 1991; Kenny & Gellrich, 2002; Norgaard, 2011) and reflection in (musical) action (Schön, 1983). Interest-

ingly, Baumeister et al. (2007) pose that only stereotyped melodies are the result of nonconscious processes (i.e., no WM is necessary for intermediate results), and that conscious processing is needed to generate melodies that can be labeled "creative." This claim gives rise to the notion that high WM capacity is necessary for creative action (De Dreu, Nijstad, Baas, Wolsink, & Roskes, 2012).

Another important internal but referred to as "software-type-of" constraint is the knowledge base, which includes "musical material and excerpts, repertoire, subskills, perceptual strategies, problem-solving routines, hierarchical memory structures and schemas, generalized motor programs, and more" (Pressing, 1998, p. 53). According to Kenny and Gellrich (2002, p. 118), the knowledge base signifies the "internalization of source materials that are idiomatic to individual improvising cultures." The knowledge base includes the referent, which is "an underlying formal scheme or guiding image specific to a given piece, used by the improviser to facilitate the generation and editing of improvised behavior" (Pressing, 1984, p. 346). Parts of the knowledge base relate to *external constraints* as well. Musical material, excerpts, and repertoire strongly relate to musical style, which includes rules that limit the improvisational act. Other external constraints may refer to status given to improvisation and the extent to which improvisation is part of the musical culture.

As is mentioned above, improvisational expertise means that the musician has the resources to circumvent and affect constraints related to improvisational task performance. These resources not only include knowledge, skills, and characteristics (e.g., specialist memory) necessary to improvise consistently on a high level (cf. Eisenberg & Thomson, 2003; Ericsson, 2006), but also those required to facilitate the development, maintenance, and adaptation of improvisational expertise (Sawyer, 2007; cf. Zimmerman, 2006). The latter aspect touches the concept of deliberate practice, which according to Ericsson (2006; Ericsson, Krampe, & Tesch-Römer, 1993; Lehmann & Ericsson, 1997) is the key to expert performance. Charness et al. (2004) follow Ericsson and posit deliberate practice as mediating variable at heart of a taxonomy of skill factors between factors like motivation and personality on the one side and the cognitive system and subsequent expert performance on the other. They underline that the former constructs are relatively underexposed in present expertise research, a statement that also counts for improvisational expertise research (Pressing, 1998). Besides, most information in the literature on practice-predisposing factors related to improvisational expertise development, maintenance, and adaption is rather speculative or is based on studies in more general contexts (e.g., popular music or just "music"). Kenny and Gellrich (2002) for instance note that flow or peak experience is an important "motivator" to persevere with performing (professional) improvisational tasks, but do not substantiate this claim with research conducted in an improvisational context. Studies on musical ability (Hallam, 2010; Hallam & Prince, 2003), musical identity (Hargreaves, Miell, & MacDonald, 2002; MacDonald & Wilson, 2005), ideal musicianship (Creech, Papageorgi, & Welch, 2010), but also creativity (e.g., Feist, 1998; Kaufman & Beghetto, 2009; Sternberg, 1985) provide valuable information on constructs besides the cognitive ones. According to Ruthsatz, Detterman, Griscom, and Cirullo (2008), it takes more than just practice to become a musical expert and probably this also counts for maintaining expertise and standing ground in a community of practice in the field of jazz (MacDonald & Wilson, 2005). A model of ideal musicianship by Creech et al. (2010) seems to validate the above as it discerns performance skills, versatility, commitment to excellence, personality, and absolute expertise (i.e., talent) as constructs that ultimately make an ideal musician. Unfortunately, the underpinning of this model is meager as it is based on in-depth interviews with 27 musicians of which four are professional jazz musicians.

In sum, studies that focus on broad conceptions of improvisational expertise are scarce and existing studies are based on relative small samples. Results of studies that elucidate more general concepts like creative expertise and musical expertise are informative but need to be validated in similar studies in the domain of improvisational (jazz) music. It is of interest to see whether core characteristics of creativity such as innovation/imagination, intrinsic motivation, independence, risk taking, breadth of interest, intelligence, high activity/energy level, and a sense of humor (cf. Sternberg, 1985) also hold for expert improvisers. The same applies for core characteristics of musical expertise such as competence in reading musical notation, quick at learning new music, superior musical memory, refined problem-solving skills, self-monitoring skill, know-how to address errors, and being good at sustaining skills (cf. Creech et al., 2010; Papageorgi et al., 2010). The present study tries to validate such findings within the context of contemporary musical improvisation in the domain of jazz music. Its goal is to reveal improvisational expertise and to identify knowledge, skills, and other characteristics that define a present-day expert improviser in the domain of jazz and improvised music. The research questions of the study are as follows (research activity between brackets):

- "Which characteristics constitute an expert musical improviser?" (Generation)
- "Which clusters/complexes of characteristics constitute an expert musical improviser?" (Clustering)
- "Which characteristics are regarded important" (Rating)
- "Which clusters/complexes of characteristics are regarded important?" (Rating)

Methodology

Participants

A total of 26 renowned musical experts residing in the Netherlands took part in the study. The experts had many years of professional experience in performing, teaching, and/or reviewing jazz and contemporary improvised music ($M_{\text{performing}} = 28.1$, $SD = 7.8$; $M_{\text{teaching}} = 23.9$, $SD = 8.4$; $M_{\text{reviewing}} = 19.7$, $SD = 11.2$). In addition to professional improvisational experience, the musicians reported on average 35.6 years ($SD = 6.5$) of general improvisational experience (i.e., inclusion of experience before performing professionally). Besides experience, the experts had excellent track records with regard to professional output (i.e., number and quality of recordings, performances, graduated students, writings, and/or broadcasts). Mean age of the experts was 51.5 years ($SD = 10.6$). All but one of the participants were men. The group of participants covered three expert subgroups, namely experts whose daily routines (a) target musical performance ("musicians"), (b) concentrate on teaching ("tertiary-level music teachers"), and (c) consist of scrutinizing and reflecting on musical

performance ("critics/researchers"). Participants could belong to different subgroups. The musicians/teachers ($n = 16$) played bass ($n = 1$), drums ($n = 2$), guitar ($n = 2$), piano ($n = 8$), trombone ($n = 2$), or reed ($n = 1$) as main instrument. The critics/researchers ($n = 10$) reviewed for daily newspapers ($n = 7$), magazines ($n = 8$), and/or national public radio and TV ($n = 1$) (combinations of media are possible).

The experts participated in a GCM study that included two data collection stages: (a) statement generation and (b) statement sorting and rating (see the "Procedure" section for a detailed description of this). The majority of experts took part in both stages. Sixteen experts (all men; representing all subgroups) entered the first data collection activity of the concept mapping study, a brainstorm session aimed at statement generation. Two groups of experts (Group 1: $n = 8$; Group 2: $n = 4$), generated statements during the sessions. Four experts who could not attend the sessions, generated statements at home, using an adapted but similar data generation procedure.

Twenty-four experts completed the second data collection activity, namely the sorting and rating of statements. This group of experts included 14 out of 16 experts participating in the first data collection activity and 10 newly recruited experts.

Procedure

Trochim's (1989) GCM method was used to reveal improvisational expertise. This method consists of a *preparation phase*, where focus, participants, and scheduling are specified; a *data collection phase*, where results of respective generating, sorting, and rating tasks are recorded; and a *data analysis phase*, where results are analyzed and interpreted. The data collection phase was adapted for reasons of output optimization (see Stoyanov & Kirschner, 2004; Wopereis, Kirschner, Paas, Stoyanov, & Hendriks, 2005). Adaptations will be emphasized here; for an elaborate discussion on the method see Kane and Trochim (2007).

Preparation phase. The first preparatory step for concept mapping was the development of the focus for generating and rating information. It included (a) the formulation of a focus prompt to start the brainstorm sessions and (b) the specification of a measure of interest to rate the results of the brainstorming. The focus prompt, worded in a complete-the-sentence format, was derived from the research goal of the study and ran as follows: "A good improviser is someone who . . ." The measure of interest for the rating aimed at the assessment of the importance of generated information. Participants valued each generated statement on a 5-point Likert scale from 1 to 5, representing *relatively unimportant*, *somewhat important*, *important*, *very important*, and *extremely important*, respectively. The second step in the preparation phase was the selection of participants. In this process, experts helped finding other experts. The third step contained the construction of materials and the scheduling and orchestration of the data collection activities. Materials made in this phase included the invitations and instructions for the data collection activities. Materials for sorting and rating (e.g., cards with statements and forms for clustering) were created halfway through the data collection phase, after the final set of statements was determined.

Data collection. Participants successively generated, sorted, and rated characteristics ("statements") of improvisational expertise. For the statement generation task, group meetings were organized; sorting and rating tasks were carried out individually at the participant's home (or other preferred place). Data collected from the three tasks were entered in Concept System Core (Version 4; Concept Systems, Inc.) and SPSS by the first author.

The statement generation task included two 10-min individual brainstorms, each followed by a round-robin presentation of results in front of the other participants for which there was no time limit. The first round-robin presentation was added to the brainstorm procedure to elicit ideation through the second brainstorm. The final presentation nurtured the closing group discussion of the meeting. To start the brainstorm session, participants were presented the focus prompt "A good improviser is someone who . . ." Complements of the focus prompt were written down on 20.5 by 9.5 cm cards and pinned to large notice boards during the round-robin presentations.

Experts who could not attend the group meetings generated statements at home. They sent the results by e-mail to the researcher. After the generation phase, all generated statements were compared in a pairwise manner to identify identical statements. Doubles and equivalent statements were removed from the set. Statements with a difference in nuance were not combined into one single statement. For instance, a statement with an adjective (clause) can have a different overall meaning compared with a similar statement with no or a different adjective (clause).

For the sorting and rating tasks, participants received an envelop by surface mail, holding a concise instruction booklet, a set of statements printed on paper cards, paperclips to bundle the cards, and a self-addressed envelope. Each statement was printed on a 10.5 by 6.4 cm card. On each card an area in the right bottom corner was allocated for rating the card statement. Further, each card included a randomly assigned identification number (#). An authentic "tabletop-based" card sort procedure was preferred to an electronic "screen-based" one because the final set of statements was too large to display on a computer screen. Further, it was expected that a conventional approach would have a less deterrent effect on task performance than a computer-based procedure.

A stepwise instruction guided the individual sorting and rating activities. This instruction included minimal rules for sorting and rating and fully relied on the structured GCM methodology for group conceptualization. For sorting, the participants were instructed to group the ideas into meaningful, content-related categories "in a way that makes sense to you." Besides the aim of the study ("We want to know what characterizes an expert improviser") no other information related to content was provided to the participants. Procedural rules for sorting included "Do not sort all statements into one category," "Do not sort every statement as its own category," "When a statement cannot be sorted together with other items, group the statement by itself," "Do not sort an item into more than one category," and "Do not create a residual category." Instructions for rating included "Rate the importance of each statement on a scale from 1 to 5, where 1 = relatively unimportant, 2 = somehow important, 3 = important, 4 = very important, and 5 = extremely important," and "Make use of the range of possible answers."

Data analysis. The analysis included three main steps. First, all sorted data of participants were aggregated into one (overall) similarity matrix (i.e., an "n-by-n" matrix where "n" is the number of generated statements). This matrix is the result of adding the cell values across the similarity matrices of the participants. Cell values

in a participant's similarity matrix can either be 1 or 0, which means that a pair of statements has either been sorted together (1) or not (0). Cell values in the total similarity matrix can range from 0 ("None of the participants sorted Statement A with Statement B") to "the total number of participant's matrices" ("All participants sorted Statement A together with Statement B"). The latter cell value indicates "proximity" of statements.

Second, a multidimensional scaling (MDS) of the total similarity matrix was conducted to locate statements as separate points on a two-dimensional point map. To determine the quality of the point map, a stress value was calculated. This diagnostic statistic measures the goodness of fit of the distances between points on the map (converted into a distance matrix) and cell values in the overall similarity matrix. Stress values can range from 0 to 1, where lower values indicate a better fit (Kane & Trochim, 2007; Kruskal & Wish, 1978). Although a clear cutoff for stress has not been agreed on in the literature, general guidelines suggest that stress values between .05 and .35 are acceptable for GCM (Petrucci & Quinlan, 2007). Meta-analytic studies on the quality of Trochim's GCM method by Rosas and Kane (2012) and Trochim (1993) support this range. They reported average stress values of .29 over 33 studies (SD = .04; range: .16–.35) and .28 over 69 studies (SD = .04; range: .17–.34), respectively. In addition, Rosas and Kane (2012, p. 241) state that multidimensional maps with a stress value $<$.39 "have less than 1% probability of having either no structure or a random configuration."

Third, a hierarchical cluster analysis (HCA) of the MDS coordinates was performed to partition the mapped points ("the statements") into clusters. Concept System Core uses Ward's algorithm to form clusters (Trochim, 1989). Basically this algorithm successively creates increasingly larger clusters. However, human judgment is necessary to monitor the clustering process and to determine the final cluster configuration. In the present GCM study, HCA started with an evaluation of a map that contained 20 clusters and sequentially analyzed maps with fewer clusters. Each consequent step focused on the merging of two clusters. The procedure stopped when a merge was not meaningful from a semantic point of view. In the course of analytic action, human judgment was informed by a "bridging analysis." This analysis helps to detect statements and areas on the map that are strongly related to each other. Bridging values (labeled "b") of statements range from 0 to 1 and help to interpret what content is associated with specific areas of the map. Statements with lower bridging values ("anchors") are generally better indicators of the meaning of their part of the map than statements with higher bridging values. Statements with higher bridging values ("bridges") can be regarded as connections between different areas on map. A cluster bridging value is the average bridging value of statements in a cluster. Lower cluster bridging values indicate better fit and consistency, which is the result of similar sorts across participants. Mean and median of the number of clusters sorted by the participants were used as post hoc expedients to validate the size of the final cluster map.

Ratings of statements helped to identify important characteristics of improvisational expertise (both on statement and cluster level).

Results

Generating Task

Sixteen experts generated 191 statements. These statements were analyzed with respect to content. Five statements were excluded from the set of statements, as their meaning was ambiguous. Six original statements covered more than one characteristic. Their subdivision led to 20 new statements (an increase of 14 statements). The new set of 200 statements was subjected to a pairwise comparison to identify semantically identical utterances. A consolidation of 46 original statements into 15 new statements reduced the set from 200 to a final set of 169 statements.

Sorting Task

Twenty-four experts sorted the 169 statements (M = 12.46 clusters; SD = 6.59; range: 2–25; Mdn: 11.50). MDS of the sort data resulted in a two-dimensional point map (see Supplemental Material [Appendix 1], first slide). The stress value for goodness of fit of the final representation with the original similarity matrix used as input was .33. This value slightly exceeds the average stress value of GCM studies reviewed in two meta-analytical studies (Rosas & Kane, 2012; Trochim, 1993), but falls within accepted ranges (Petrucci & Quinlan, 2007). It also does not exceed .39, which can be regarded a threshold for a 1% probability of having no structure.

The HCA of the MDS coordinates combined with a structured interpretation process resulted in a set of seven clusters (see Figure 1). The merging of clusters from 20 to 7 was a relatively straightforward process. The last meaningful merge of clusters was from 8 to 7. At that cluster level, the two clusters that fused into one contained both statements related to the concept "affect." One of the two merging clusters included statements like "a good improviser is someone who is sensitive to atmosphere, colors" (statement identification number #3), ". . . with a passion for music" (#105), and ". . . who keeps subconscious and conscious in balance" (#17). The other merging cluster consisted of similar statements such as ". . . who is sensitive" (#47), ". . . who is passionate" (#98), and ". . . who is balanced" (#26). A subsequent merge of clusters from 7 to 6 was regarded meaningless, as it would lead to a cluster that is large (n = 41) and conceptually broad ("self-regulation" and "creation"). Supplemental Material (Appendix 1) shows an animation of the hierarchical cluster-tree analysis from a 20- to the final 7-cluster solution. Supplemental Material (Appendix 2) shows descriptive statistics of the 7 clusters and the 169 statements. Table 1 is an excerpt from Supplemental Material (Appendix 2) and presents for each cluster three statements with the lowest bridging values.

The cluster central to the map focuses on self-regulatory aspects of improvisational expertise. Statements (n = 19) in this "self-regulation" cluster refer to knowledge, skills, and attitudes needed to start, go through, and end an improvisation. The cluster is about recognizing useful ideas, making musical connections, anticipation, playing, and not playing. Examples of statements are ". . . who draws musical connections quickly" (#69), ". . . who anticipates" (#150), and ". . . who is able to play nothing when he hears nothing" (#20). Some statements explicitly deal with monitoring the musical act (e.g., ". . . who can helicopter above one's own

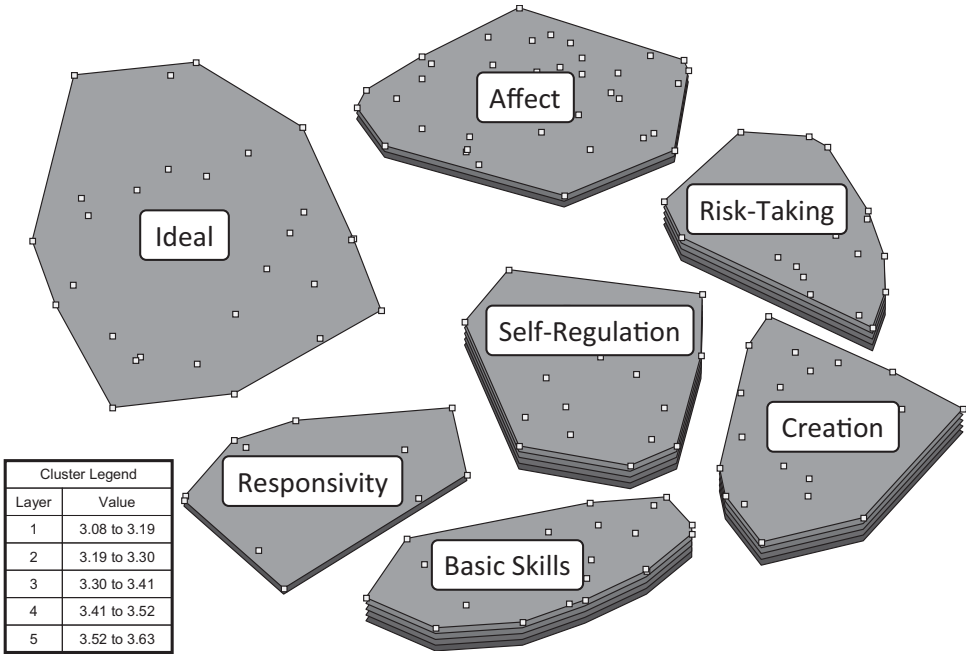

Figure 1. Cluster rating map.

music," #124) and reflection on musical action (e.g., ". . . who dares to listen to himself critically," #48). The cluster has a low average bridging value ($M = 0.09$), indicating that it is robust and an anchor to other clusters on the map, rather than a bridge between clusters.

Statements ($n = 26$) in the cluster "basic skills" refer to knowledge, skills, and attitudes, which are regarded elementary to improvisation. They include references to skills and abilities that count for musical performance in general and musical improvisation in particular. Examples of statements that refer to musical performance in general are ". . . who masters his instrument" (#169), ". . . with a highly developed sense of rhythm" (#23), and ". . . who has a large auditory memory" (#80). Some basic statements related to the improvisational act are ". . . who is able to structure" (#112), ". . . who makes use of the possibilities of his instrument" (#114), ". . . who can generate melodic and rhythmic ideas" (#61), ". . . who knows a lot of different solutions to one musical 'problem'" (#154), ". . . who can respond quickly to changes in all musical situations" (#86), and ". . . who is able to integrate tradition into his own style" (#115). Interestingly, the only utterance related to the development, maintenance, and adaption of improvisational expertise is positioned in this cluster (i.e., ". . . who studies in such a way that he is able to transform what he studied outside the frameworks he studied" [#167, $M = 3.38$, b = .31]). The cluster has a relatively low average bridging value ($M = 0.16$), indicating coherency and not being a "bridging cluster."

The cluster "affect" includes statements ($n = 36$) primarily aiming at the experience of feeling or emotion related to improvisational acting. Many statements in this cluster relate to musical proficiency in general. Examples are ". . . who is open-minded" (#129), ". . . who has fun" (#128), ". . . who has a degree of spontaneity, otherwise you shouldn't bother" (#132), ". . . who is flexible" (#67), ". . . who is sensitive" (#47), ". . . who can concentrate well" (#104), ". . . with degree of humor" (#41), ". . . with confidence" (#155), and ". . . who radiates identity; personality" (#44). The cluster has a relatively low average bridging value ($M = 0.18$), indicating coherence and robustness.

The cluster "risk-taking" involves statements ($n = 22$) related to managing personal and musical constraints. Examples of statements related to constraints are ". . . who looks for boundaries and pushes them" (#31), ". . . who does not consider frameworks limiting, but uses/misuses them for new forms and thoughts" (#62), ". . . who sets foot on stage with an open mind and with all ears, ready for the unexpected" (#73), ". . . who always tries to surpass oneself (pushing the envelope) and doesn't avoid leaving the beaten track" (#70), ". . . who knows his limitations and plays with them" (#14), and ". . . who is able to find freedom within constraints" (#101). An attitude frequently cited in statements belonging to this cluster is daring or guts. Examples are ". . . who dares taking risks and who is adventurous, but not reckless" (#27), ". . . who dares to fall flat on his face" (#151), ". . . who dares to make choices" (#145), ". . . who dares to follow his musical impulses" (#40), and ". . . who dares to create contrast" (#38). The cluster has an average bridging value of .30, meaning this cluster is relatively stable.

The cluster "creation" features statements ($n = 22$) related to the kernel of improvisation, which is creating music on the spot. Statements include concepts like form and construct and verbs like organizing, generating, composing, making, and responding. Examples of statements are ". . . who has an eye for form" (#108), ". . . who is able to organize musical thoughts, ideas on the spot. Someone who brings order to chaos" (#66), ". . . who is an instant composer" (#130), ". . . who is capable of picking up a musical idea, transforming it, and passing it on" (#54), ". . . who is able to create musical connections in real-time (so can also immediately

Table 1
Cluster Bridging Values, Cluster Ratings, Number of Statements Within a Cluster, and Per Cluster Three Statements With the Lowest Bridging Values

Cluster	Bridging	Rating	Count
Self-regulation	.09	3.63	19
. . . who draws musical connections quickly (#69)	.00	3.79	
. . . who understands that not playing is also playing (#51)	.00	3.79	
. . . who is able to play nothing when he hears nothing (#20)	.03	3.75	
Basic skills	.16	3.61	26
. . . who masters his instrument (#169)	.06	3.63	
. . . with a highly developed sense of rhythm (#23)	.06	4.04	
. . . who makes use of the possibilities of his instrument (#114)	.07	3.79	
Affect	.18	3.32	36
. . . who is passionate (#98)	.02	3.96	
. . . who is open-minded (#129)	.02	3.54	
. . . who has fun (#128)	.05	3.67	
Risk-taking	.30	3.59	22
. . . who does not consider frameworks limiting, but uses/misuses them for new forms and thoughts (#62)	.14	3.92	
. . . who always puts the music first, not his ego (#144)	.16	4.13	
. . . who dares taking risks and who is adventurous, but not reckless (#27)	.18	3.50	
Creation	.33	3.60	22
. . . with musical mastery; someone who is able to organize musical thoughts, ideas on the spot. Someone who brings order to chaos (#66)	.06	3.33	
. . . who doesn't like repetition, improvisation done (#136)	.12	2.50	
. . . who has developed musical intuition and can use it (#148)	.14	4.00	
Responsivity	.48	3.23	16
. . . who—whether or not starting from existing material—creates new music that is both comprehensible and surprising, both reassuring and disturbing (#89)	.20	3.29	
. . . who spontaneously thinks of and tells a coherent story (#82)	.20	3.67	
. . . who is able to play according to his/her interpretation of the essence of the music (#4)	.24	4.00	
Ideal	.70	3.08	28
. . . who manages to create conditions for himself that provide opportunities for the largest opportunity for inspiration (#74)	.36	3.67	
. . . who manages to immediately reach the audience, by starting his improvisation with certainty and authority (#118)	.40	2.96	
. . . who can work together (#92)	.43	3.50	

respond to mistakes of others)" (#159), and ". . . who is able to incorporate a mistake in his improvisation, sometimes even as springboard for unexpected developments" (#39). This cluster has an average bridging value of .33, indicating a relatively stable cluster.

The cluster "responsivity" highlights statements ($n = 16$) related to the nature of the improvisation. Statements in this cluster emphasize that the outcome of improvising should be characteristic, understandable, coherent, and meaningful, and should be based on a personalized knowledge base (one's own musical idiom), which is influenced by other music, art forms, and even ambient sound. Interaction with other musicians promotes this outcome. Examples of statements are ". . . who is able to tell a sensible musical story (i.e., give a sensible use of time), being able to utilize one or multiple types of musical or extramusical information" (#123), ". . . who explores/draws inspiration from music and other art forms" (#10), and ". . . who responds to fellow musicians" (#137). This cluster has an average bridging value of .48, indicating moderate consistency.

The cluster "ideal" comprises statements ($n = 28$) related to perceived idealized improvisational expertise. It includes statements like ". . . who deserves respect" (#88), ". . . who plays beautifully" (#87), ". . . who touches me emotionally" (#68), ". . . who surprises" (#16), and ". . . who fascinates me" (#75). This cluster has an average bridging value of .70, indicating low consistency.

Rating Task

The 24 experts rated the 169 statements 3.42 ($SD = 0.44$) on average. The highest average rating for a statement was 4.33 ($SD = 1.13$) and the lowest average rating was 1.21 ($SD = 0.59$). One statement had a median of 5, 1 statement had a median of 4.5, and 86 statements had a median of 4. Twenty-two statements had a modus of 5. Three statements (approximately 2% of the 169 statements) were rated as relatively unimportant (average rating <2.00). One hundred forty-six statements (approximately 86%) were regarded somewhat to very important (range: 2.00–3.99). Twenty statements (approximately 12%) were rated very to extremely important (≥ 4.00).

The 10 highest rated statements are presented in Table 2. The experts regard these statements very to extremely important. However, moderate standard deviations indicate the statements were not equally valued by the experts. The highest valued utterance in the "top 10" refers to a passion for music ($M = 4.33$, #105). Four out of 10 statements emphasize the importance of listening skills.

Table 2
Ten Highest Valued Statements

Rank	Number (#)	A good improviser is someone . . .	Cluster	*M*	*SD*	Range
1	105	. . . with a passion for music	3	4.33	1.129	1–5
2	77	. . . who has very good ears and listens with them/. . . who is able to listen very well/. . . with a good sense of hearing/. . . with a good set of ears/. . . who listens (well)	2	4.29	0.624	3–5
3	19	. . . who has a personal, recognizable voice	5	4.29	0.751	3–5
4	53	. . . who can listen attentively to the music surrounding him	5	4.25	0.737	3–5
5	65	. . . who can listen well to others	7	4.21	0.779	3–5
6	151	. . . who dares to fall flat on his face/. . . who is not afraid of making mistakes/. . . who dares to make mistakes	4	4.21	0.833	2–5
7	164	. . . with ideas	3	4.21	0.977	1–5
8	2	. . . who reacts to contributions of fellow musicians in an alert way, in exciting interaction	7	4.17	0.702	3–5
9	48	. . . who dares to listen to himself critically/. . . who is able to listen to himself	1	4.17	0.761	3–5
10	137	. . . who responds to fellow musicians/. . . who can respond to fellow musicians	6	4.17	0.761	3–5

Note. Cluster 1 = self-regulation; 2 = basic skills; 3 = affect; 4 = risk-taking; 5 = creation; 6 = responsivity; 7 = ideal.

They refer successively to good hearing ($M = 4.29$, #77), listening attentively to surrounding music ($M = 4.25$, #53), listening well to others ($M = 4.21$, #65), and listening critically/well to yourself ($M = 4.17$, #48). Two statements in the top 10 relate to musical interactivity and focus on the ability to respond to fellow musicians ($M = 4.17$, #2; $M = 4.17$, #137). The remaining statements in the ranking refer to having a personal voice ($M = 4.29$, #19), daring to make mistakes ($M = 4.21$; #151), and having ideas ($M = 4.21$, #164), respectively.

Average cluster ratings are presented in Table 1 and depicted as "layers" in the cluster rating map (see Figure 1). All clusters are regarded important ($M > 3.00$). The clusters "self-regulation," "basic skills," "creation," and "risk-taking" are rated relatively high. Relatively moderately rated are the clusters "affect" and "responsivity." The cluster "ideal" is relatively low-rated.

Discussion

This study explored expert views on improvisational expertise. Based on the individual input of 26 musical experts, a 7-cluster concept map of improvisational expertise was specified. This section first discusses the generated statements (research question 1), the cluster map (research questions 2 and 4), and a selection of highly ranked salient statements (research question 3). Subsequently, it considers implications for instruction. Finally, it presents limitations and shortcomings of the study and suggestions for future research.

Generated Statements

The experts generated a varied set of statements, which included utterances on knowledge, skills, attitudes, values, and personality traits related to improvisation in particular and music making in general. The statements covered psychomotor (technical skill), conative (will/drive), cognitive (knowledge/skill/memory), and affective (passion, risk taking) elements of improvisational behavior. Interestingly, the topic of expert learning and development was underexposed in the generated data. The data contained only one utterance that was directly related to expert learning (i.e., ". . . who studies in such a way that he is able to transform what he studied outside the frameworks he studied" [#167]). Apparently, the participants were not triggered to generate information on expert jazz musicians' deliberate practice (cf. Noice, Jeffrey, Noice, & Chaffin, 2008) and lifelong learning activities (cf. Smilde, 2012), both important expedients of expertise (Ericsson, 2006).

The varied set of statements enabled the experts to frame a broad holistic conception of improvisational expertise, which will be discussed in the next section.

Cluster Map

The seven clusters in the cluster map represent seven constituents of improvisational expertise. The cluster central to the map holds statements related to self-regulation, an acknowledged important element of expert behavior (Bandura, 1986; Creech et al., 2010; Zimmerman, 2000, 2006). According to Zimmerman (2006, p. 706) expertise entails self-regulating covert cognitive and affective processes, behavioral performance, and environmental setting during the cyclic phases "forethought," "performance," and "self-reflection." Interestingly, statements put together in the cluster "self-regulation" fit Zimmerman's theoretical framework.

An example of a high-valued self-regulatory statement related to *forethought phase* is "a good improviser is someone who anticipates" ($M = 3.71$, #150). According to Biasutti and Frezza (2009) anticipation "requires the ability to plan the improvisation and to have a comprehensive idea of the whole solo. It involves a 'plan,' an abstract homomorphism representing the essential structure of the performance." (p. 236). In a factor analytic study on improvisation processes, they identified anticipation as one of five factors. Norgaard (2011) found similar utterances in a qualitative study and summarized them as "sketch plans" for upcoming musical passages. A speculative model of mental improvisational processes proposed by Kenny and Gellrich (2002) differentiates between short-term anticipation (0.3–3.0 s), medium-term anticipation (3–12 s), and long-term anticipation (remainder of the improvisation).

Examples of self-regulatory statements given by the experts that are related to Zimmerman's *performance phase* are monitoring (e.g., ". . . who can helicopter above one's own music" [$M = 3.33$,

#124] and ". . . who knows what there is to know about the subject and therefore has an overview of what could be realized at a given moment, and what not" [M = 2.88, #22]) and steering (e.g., ". . . who strikes out and enforces a musical course during improvisation and simultaneously gives free rein to codetermining contributions of other musicians" [M = 3.71, #37]). These examples are about managing the improvisation process while it is taking place. As such they relate to Norgaard's (2011) concept of evaluative monitoring and Schön's (1983) concept of reflection in action. Monitoring statements are regarded important, but not extremely important by the experts. This might be related to the experts' belief that musical intuition is a very important constituent of improvisational expertise (cf. ". . . who realizes that beside knowledge and skill, intuition is an essential part of improvisation" [M = 3.67, #56]). Lower perceived values for conscious monitoring activities are not surprising, especially when intuition is defined as "understanding or knowing without conscious recourse to thought, observation, or reason" (Gallate & Keen, 2011, p. 683). To regard intuition as an impetus for improvisation is consistent with the notion that expert improvisation in music is largely automated and that no WM is necessary to create melodies (cf. Johnson-Laird, 1991, 2002). It also relates to states of flow in which musicians lose their self-consciousness and are left to intuition when improvising because there are no resources left in WM (Csikszentmihalyi & Rich, 1997; Dietrich, 2004). Interestingly, Baumeister et al. (2007) state that supervision by conscious processing (and thus a WM) is necessary to fashion creative melodies. Although it is under debate what conscious processing during improvisation exactly comprises, it is accepted that in the course of musical action states of consciousness alter (Dietrich, 2004; Fidlon, 2011). The statement "a good improviser is someone who keeps subconscious and conscious in balance" (#17 in cluster "affect") might emphasize this.

A highly valued example of a statement belonging to the *self-reflection phase* is the ability to listen critically/well to yourself (M = 4.17, #48). Critical listening, interpreted as a form of self-judgment (i.e., evaluation, attribution) and self-reaction after the improvisational act, can be seen as reflection on action (cf. Schön, 1983). According to McPherson, Nielsen, and Renwick (2013) a critical attitude toward musical skill is an important constituent of musical expertise. Critical listening serves this attitude.

The cluster "basic skills" includes statements related to the basics of music making in general and improvisation in particular. The group experts in this study consider general basic skills like a sense of hearing (M = 4.29, #77), a sense of rhythm (M = 4.04, #23), and instrumental mastery (M = 3.63, #169) as very important prerequisites for improvising. Interestingly, these items are also valued very high in studies on musicians' perceptions of general musical ability (Hallam, 2010; Hallam & Prince, 2003). The identification of a basic skills cluster is in line with findings of Biasutti and Frezza (2009) who extracted "basic skills" (e.g., singing in tune, pitch recognition) as an "ability" factor from a principal component analysis on improvisation abilities. In addition to the general basics, the experts in the present study also generated statements focusing on improvisation alone, such as ". . . who has a good feeling for musical tension" (M = 3.88, #119), ". . . who can adequately respond musically and instrument-technically to the melodic, harmonic, and rhythmic impulses and to changes in the (musical) environment in which he is situated" (M = 3.83, #55), ". . . who knows a lot of different solutions to one musical 'problem'" (M = 3.33, #154), and ". . . who knows the idiom in which he plays" (M = 3.38, #9). The latter two statements specifically refer to the improviser's knowledge base, an important constituent of improvisational expertise. Pressing (1998) conceives the knowledge base as an important tool for improvisation fluency. It is built into long-term memory and differs in richness and refinement between novices and experts (see also Johnson-Laird, 1991, 2002). Many statements generated by the experts refer to declarative and procedural knowledge, though not within the basic skills cluster. For instance, the statement ". . . who knows when to end his improvisation" (M = 3.67, #33) falls within the cluster "self-regulation." Interestingly, the statement that "a good improviser is someone who plays from knowledge" (M = 2.79, #36) is rated somewhat important, which might indicate a moderate aversion of experts to concepts like *cognition* and *knowledge*.

The cluster "affect" is a relatively large cluster, representing mainly attitudes and personality traits. As is the case with other clusters, statements in this cluster refer to musical expertise in general or improvisational expertise in particular. The cluster contains this study's highest-rated statement, namely that "a good improviser is someone with a passion for music" (M = 4.33, #105). This may state the obvious, but validates the notion that a "drive toward music" is an important factor for predicting a successful professional career in music (Bonneville-Roussy, Lavigne, & Vallerand, 2011; Manturzewska, 1990). Other "affect" statements relate to authenticity (M = 4.13, #96), fun (M = 3.67, #128), flexibility (M = 3.62, #67), personality (M = 3.61, #44), self-confidence (M = 3.54, #155), and open mindedness (M = 3.54, #129). Statements in this cluster that refer to "personality" and "authenticity" strongly relate to statements in the cluster "creation," like "personal voice."

The cluster "risk-taking" includes attitudes and personality traits. Unlike "affect," the statements in this cluster mainly focus on improvisational expertise. Although attitudes like having guts and daring are also important for nonimprovised musical performances (e.g., overcoming stage fright/performance anxiety), these are recognized constituents of improvisational expertise (Azzara, 2002; Berliner, 1994; Kenny & Gellrich, 2002). Interestingly, Vuust et al. (2010) found that undergraduate students in improvisational musical genres like jazz scored high on boredom susceptibility (a constituent of sensation seeking), which not only relates to statements like ". . . who dares to make mistakes" (M = 4.21, #151) and ". . . who dares taking risks and who is adventurous, but not reckless" (M = 3.50, #27), but also connects to utterances like ". . . who sets foot on stage with an open mind and with all ears, ready for the unexpected" (M = 3.83, #73) and ". . . who always plays as if there is no tomorrow; never plays on autopilot and who totally goes for it" (M = 3.96, #152).

The cluster "creation" includes many fundamental aspects of instant music making. The most highly rated statements refer to the aspect of novelty, an important constituent of creativity. Statements like "a good improviser is someone who has a personal, recognizable voice" (M = 4.29, #19) and ". . . who manages to keep one's own sound/voice in every music he or she creates" (M = 4.17, #162) underline novelty (McMillan, 1999). Interestingly, the statement ". . . who doesn't like repetition, improvisation

done" (M = 2.50, #136) was rated relatively low, suggesting that improvisational performances may also include musical excerpts that have been played (or "created") before. This touches the discussion whether the improvisation of melodies is in essence a rule-based note-for-note creation (Johnson-Laird, 2002) or merely a formulaic process where note groups or "licks" are linked together (Norgaard, in press; Pressing, 1988).

The cluster "responsivity" consists of statements that reflect interaction. Interaction relates to the environment one performs in and includes other musicians, the audience, but also other "artificial" stimuli (Custodero, 2007). Although the consistency of this cluster is moderate due to the presence of statements that relate to other topics, the cluster includes a set of highly valued interaction-related statements, such as ". . . who responds to fellow musicians" (M = 4.17, #137) and ". . . who is good at communicating musically with fellow musicians" (M = 3.96, #103). These statements relate to collaboration skills, which according to Sawyer (2007) are important constituents of expertise.

Although the cluster "ideal" is not consistent and robust with regard to its content, it consists of some interesting statements that relate to both the process and the product of expert improvising. For instance, two statements refer to the aesthetics of the improvisational product and state that "a good improviser is someone who plays beautifully" (M = 2.67, #87) and ". . . who creates beauty" (M = 2.96, #135). The ratings indicate that these statements are regarded reasonably important by the experts. However, the musicians/teachers rated these items lower than the critics, which is an interesting finding that merits further investigation. Further, two statements relate to the profession and again received little credit. The first of these two statements says that "a good improviser is someone who during the arrangement of concerts: finishes compositions, emails band members about performances, gives a telephone interview for a local radio station, emails a high resolution picture to a jazz podium, reschedules music lessons, does the dishes, watches a performance of Art Pepper on YouTube, installs new software, submits compositions to 'BUMA,' and makes an appointment for car maintenance" (M = 2.00, #111). The second statement says that "a good improviser is someone who probably has a rough time financially" (M = 1.21, #93). Although these statements are regarded somewhat trivial (low ratings), they reflect the hectic and uncertain situation that imbues the musical profession (MacDonald & Wilson, 2005; MacDonald et al., 2012).

Salient Statements

In this section, the 10 most valued statements are discussed (see Table 2). It is notable that half of the statements account for musical expertise in general. These statements refer to passion (ranked no. 1) and listening (ranked no. 2, 4, 5, and 9). According to the experts, a good improviser is first and foremost someone with a passion for music (statement #105). This statement was elaborated on in the previous section. Four statements are related to the ability to listen well and refer to (a) the identification, rating, and modification of parameters of musical performance (statement #77), (b) the aptitude of "listening as engaged hearing" (statements #53 and #65), and (c) the skill to critically listen to yourself in/after the course of action (statement #48). The importance of these facets of listening is widely acknowledged in the domain of music (e.g., Lehmann, Sloboda, & Woody, 2007). A statement exclusively related to improvisational expertise relates to having "a personal, recognizable voice" (#19). According to McMillan (1999), the maturation of a personal voice or individual style is considered the final step toward improvisational expertise. Bailey (1992, p. 53) states that there is a tendency to skip this step, the result being that only a few expert musicians actually contribute to the innovation of musical styles. McMillan (1999) identifies three factors that influence the development of a personal voice, namely stylistic independence, musical relationships between players, and the ability to take risks. The last factor relates to the high-rated statement that a good improviser is someone who "dares to make mistakes" (#151). This statement belongs to the cluster "risk-taking" that was discussed in the previous section (see also Vuust et al., 2010). The experts further feel that a good improviser should be someone with ideas (#164). This is in line with Azzara (2002) who defines improvisation as "the spontaneous expression of musical ideas."

Implications for Instruction

Contemporary instructional design theories prescribe a whole-task sequencing approach for learning complex skills (Merrill, 2002; Van Merriënboer & Kirschner, 2013). Van Merriënboer and Kirschner (2013) define this as an approach in which the training immediately starts with learning tasks based on the simplest version of real-life tasks. The cluster map provides valuable information for the design of whole tasks. Elements of clusters that are regarded important for expert task performance, such as self-regulation, risk-taking, and affect, should be part of learning tasks right from the beginning. This whole-task approach is not new, as it was part of informal apprenticeship learning in former jazz communities like the ones described by Berliner (1994). However, it is at times lacking in present-day formal educational settings (cf. Mengelberg, 2012). Further, the statements within the cluster provide standards or criteria for task performance. An example of a standard is that a good improviser should surprise (M = 3.79, #16), which according to Boden (2010) is an important constituent of creativity (beside originality and effectiveness; see "Introduction"). Eisenberg and Thompson (2003) found that apart from creativity, complexity and technical goodness are important criteria to assess improvisational tasks. Especially the clusters basic skills, risk-taking, and creation provide important standards related to these criteria. The range of statements further shows that expert improvisation means being able to adapt to unfamiliar situations and to challenge existing stylistic rules. Formal education should prepare learners for such situations and should strive for gaining adaptive expertise (Hatano & Inagaki, 1986; Sawyer, 2007).

Limitations, Shortcomings, and Future Research

This study yielded a two-dimensional concept map, representing an expert view on improvisational expertise. A stress value of .33 was calculated, indicating acceptable map quality (Petrucci & Quinlan, 2007; Rosas & Kane, 2012; Trochim, 1993). However, a stress value larger than zero also indicates that not all experts clustered the statements identically, which can also be inferred from the range of clusters the experts produced. This study aimed to present a comprehensive view based on input of a variety of

stakeholders in the field of jazz improvisation. In light of this, some variation in the individual clustering was not problematic. However, for future research it will be interesting to compare maps of categories of experts (i.e., musicians, teachers, critics, researchers) and examine whether this will result in increased cluster similarity within groups and subsequent lower stress values. Therefore, the number of participating experts would need to be extended.

A slightly different view between (groups of) experts on improvisational expertise can also be the result of a different interpretation of the concept expert (cf. Chi, 2006; Dreyfus & Dreyfus, 1980; Ericsson, 2006; Hoffman, 1998). A "good" or "expert" improviser might evoke the image of an eminent artist (Big-C creativity), a proficient craftsman (Pro-C creativity), or both (cf. Kaufman & Beghetto, 2009). In the present study, it was expected that the experts would refer to professionals recognized by the field (cf. Csikszentmihalyi & Rich, 1997). Future research on improvisational expertise might differentiate. Future research could also address generalizations of findings. Do experts in other improvisational fields, like classical music and hip hop, generate identical statements and clusters of statements? Research of Biasutti and Frezza (2009) suggests that improvisation experts in different genres have similar conceptions regarding improvisation. In a same vein, a replication of this study could be done in different countries around the world. The present study provided a Dutch perspective on improvisational expertise that ideally should be replicated for reasons of generalizability.

Conclusion

This study resulted in a comprehensive concept map on improvisational expertise, which represents a contemporary common view of a varied group of experts in the domain of jazz and improvised music. The map represents characteristics of expert improvisational behavior related to the improvisational act and puts self-regulation at the heart of improvisational expertise as an anchor to thematically categorized domain-specific knowledge, skills, attitudes, values, and personality traits. Interestingly, the study did not identify expert (lifelong) learning skills as an important constituent of improvisational expertise. This indicates that the experts were mainly focused on the kernel of improvisational expertise, which is instant music making.

For educators in the field of jazz improvisation, the concept map reveals interesting information for designing learning tasks and instructional support. Besides the knowledge, skills, and attitudes necessary to perform improvisational tasks, it exposes standards and criteria for assessing these tasks. Additionally, for all stakeholders in the field of jazz improvisation, this study presents a current holistic view of improvisational expertise, which might help to critically reflect on the evolution of the profession.

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Correction to Vassilakis (2013)

The book review titled "The Psychology of Music in Multimedia" by Pantelis N. Vassilakis (*Psychomusicology: Music, Mind, and Brain*, Vol. 23, No. 3, pp. 196–199. doi: 10.1037/pmu0000023), included a misspelled name in the text. On page 198, Mark Shevy's name was misspelled as Mark Chevy. The online version of this article has been corrected.

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