Mid-Level Analysis of Monophonic Jazz Solos. A New Approach to the Study of Improvisation

Klaus Frieler,[*1] Martin Schütz[#2],

Martin Pfleiderer[*3]

[*]*Institute for Musicology., University of Music Franz Liszt Weimar, Germany*
[#]*Institute for Systematic Musicology, University of Hamburg, Germany*
[1]klaus.frieler@hfm-weimar.de, [2]martin.schuetz@posteo.de, [3]martin.pfleiderer@hfm-weimar.de

ABSTRACT

Background

Jazz improvisation has mostly been investigated using either detailed analysis of selected solos (see Pfleiderer & Frieler, 2010 for an overview) or combination of performer interviews and ethnographical accounts (e.g. Berliner, 1994; Norgaard 2008). Recently, a qualitative mid-level approach of annotating jazz piano solos with regard to underlying playing strategies has been developed (Schütz, 2012; Lothwesen & Frieler, 2013, Frieler, Lothwesen & Schütz, 2012). These mid-level plans ("ideas") result in musical units of about 2-3s which are probably shaped by overlearned, semi-automatic motor processes. The annotation method showed high external validity according to interviews with performers (Schütz, 2015), and admits also statistical analysis, thus, contributing to a deeper phenomenology of jazz solos, which in turn provides new and more solid evidence for models of jazz solo improvisation (e.g., Pressing, 1988).

Aims

This study aims at gaining a deeper understanding of the creative processes during jazz improvisation.

Method

Building on the system of idea categories as proposed by Schütz (2012), a modified version specifically suited for monophonic jazz improvisation was devised and further enhanced with syntactical rules for expressing relationships between musical units in order to capture motivic improvisation. The system consists of nine main categories ("line", "lick", "theme", "quotation", "melody", "rhythm", "expressive", "fragment", "void") with 19 sub- and 38 sub-subcategories. It was fine-tuned and evaluated together with the designated annotators in an iterative process in order to maximise inter-rater consensus beforehand. Seventy-seven solos by 48 different performers from the Weimar Jazz Database covering a range of styles (Swing, Bebop, Hard Bop, Cool, Postbop) were annotated, resulting in a total of 3040 ideas. Inter-rater reliability was estimated to be about 90% for segmentation borders and about 75% for category labelling.

Results

Expectedly, the most common main categories were licks (42.7%) and lines (32.8%), with the most frequent subcategory of wavy lines (lines with twist and turns). Distribution of categories did not differ significantly between styles, though there are some tendencies, as expressive and rhythmic ideas can be found more often in postbop solos, thematic ideas more often in swing solos, and melodic ideas more often in cool jazz. Moreover, the largest proportion of lines as well as the smallest proportion of thematic improvisation can be found in hardbop solos. Average duration of mid-level units ranged from 0.5 s (fragments) to 3.5s (theme) with a grand average of 2.23 s, well in line with earlier results (Schütz, 2015). About 20-30% (AM = 28%, range 0-60%) of ideas were based on motivic improvisation, i.e., derived from some other idea, whereby long-range correlations between ideas were rather scarce, with an average relationship distance of 0.55 ideas (SD=0.47). Mean length of motivic chains was 2.8 (SD=0.96), indicative of frequent AA'A'' structures. With respect to amount of motivic improvisation, there were no significant differences between styles (Kruskal-Wallis test, $\chi^2(4) = 2.08$, $p = 0.721$), but performers differed considerably (Chi-Square test $\chi^2(47) = 211.53$, $p < 0.001$).

Conclusions

The mean duration of mid-level units lies in the vicinity of the subjective present (Fraisse, 1982), which can be linked to the chunk size of working memory (Pöppel, 1997). To our view, this is a strong hint that the annotated categories are indeed reflecting (to some extent) operational planning processes in the mind of the performers. This is also in line with the results from Schütz (2015), who confronted jazz piano player with the method of mid-level analysis, which most players considered as a valid description of their improvising. However, an alternative explanation for this result might be due to the subjective present of the annotators. But, we deem the first interpretation more likely, since the annotators were working analytically and not in real-time.

We observed that motivic improvisation is not confined to certain styles and players (e.g. Sonny Rollins, see Schuller 1958), but can be found in nearly all examined jazz solos, though to largely varying amounts.

To sum up, by combining the benefits of qualitative and quantitative methods the proposed mid-level approach further solidifies and enhances our knowledge of creative strategies

during jazz improvisation. For the future, we plan to annotate a more extensive set of solos as well as to analyse the sequences of ideas in more detail, e.g., using automated classification, Markov chains, and feature analysis.

Acknowledgments

This work was supported by DFG grant DFG-PF 669/7-1. We like to thank Friederike Bartel, Martin Meusinger, and Benjamin Burkhart for annotating the better part of the solos.

Keywords

Improvisation, Jazz, Melody, Structure, Creativity, Cognition, Mid-level Analysis

REFERENCES

Berliner, P. F. (1994). *Thinking in Jazz. The Infinite Art of Improvisation.* Chicago: University of Chicago Press.

Fraisse P (1982) Rhythm and tempo. In: Deutsch D (Ed), *The Psychology of Music* (pp. 149–180). Orlando, FL: Academic.

Frieler, K., Lothwesen, K. & Schütz, M. (2012). The Ideational Flow: Evaluating a New Method for Jazz Improvisation Analysis. In: *Proceedings of the 12th ICMPC and 8th ESCOM*, Thessaloniki, Greece.

Lothwesen, K. & Frieler, Klaus (2013). Gestaltungsmuster und Ideenfluss in Jazzpiano-Improvisationen. Eine Pilotstudie zum Einfluss von Tempo, Tonalität und Expertise. In: Lehmann, A.C., Jeßulat, A. und Wünsch, C. (Ed.) *Kreativität: Struktur und Emotion*, Würzburg: Königshausen & Neumann.

Noorgard, M. (2008). Descriptions of Improvisational Thinking by Artist-level Jazz Musicians. University of Texas, PhD Dissertation.

Pfleiderer, M. & Frieler, K. (2010). The Jazzomat project. Issues and methods for the automatic analysis of jazz improvisations. In: Bader, R., Neuhaus, C. & Morgenstern, U. (Eds.) *Concepts, Experiments, and Fieldwork: Studies in Systematic Musicology and Ethnomusicology* (pp. 279-295), Frankfurt/M., Bern: P. Lang.

Pöppel, E. (1997). A hierarchical model of temporal perception. *Trends in Cognitive Sciences, 1*, pp. 56–61.

Pressing, J. (1988). Improvisation: Methods and Models. In: Sloboda, J. A. (Ed.). *Generative Processes in Music* (pp. 129-178), Oxford: Oxford University Press.

Schütz, M. (2012). Improvisation in Jazz: "Stream of Ideas"-Analysis of Jazz Piano-Improvisations. In: *Proceedings of the 12th ICMPC and 8th ESCOM*, Thessaloniki, Greece.

Schütz, M. (2015). *Improvisation im Jazz. Eine empirische Untersuchung von Jazzpianisten auf der Basis der Ideenflussanalyse*. Dissertation Universität Hamburg, Hamburg: Verlag Dr. Kovac.

Schuller, G. (1958). Sonny Rollins and the Challenge of Thematic Improvisation. *Jazz Review*, Nov. 1958, pp. 6-11.