

**STYLE AND TRADITION IN STRING
QUARTET PERFORMANCE**

*A STUDY OF 32 RECORDINGS OF BEETHOVEN'S
OP. 131 QUARTET*

Volume 2

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Supplementary Figures

This section includes full sets of figures for all performances studied. All figures are referred to from Volume 1, and the figure numbering scheme references the chapters in Volume 1. 'Fig. 3.1', for example, is the first figure that relates to chapter 3.

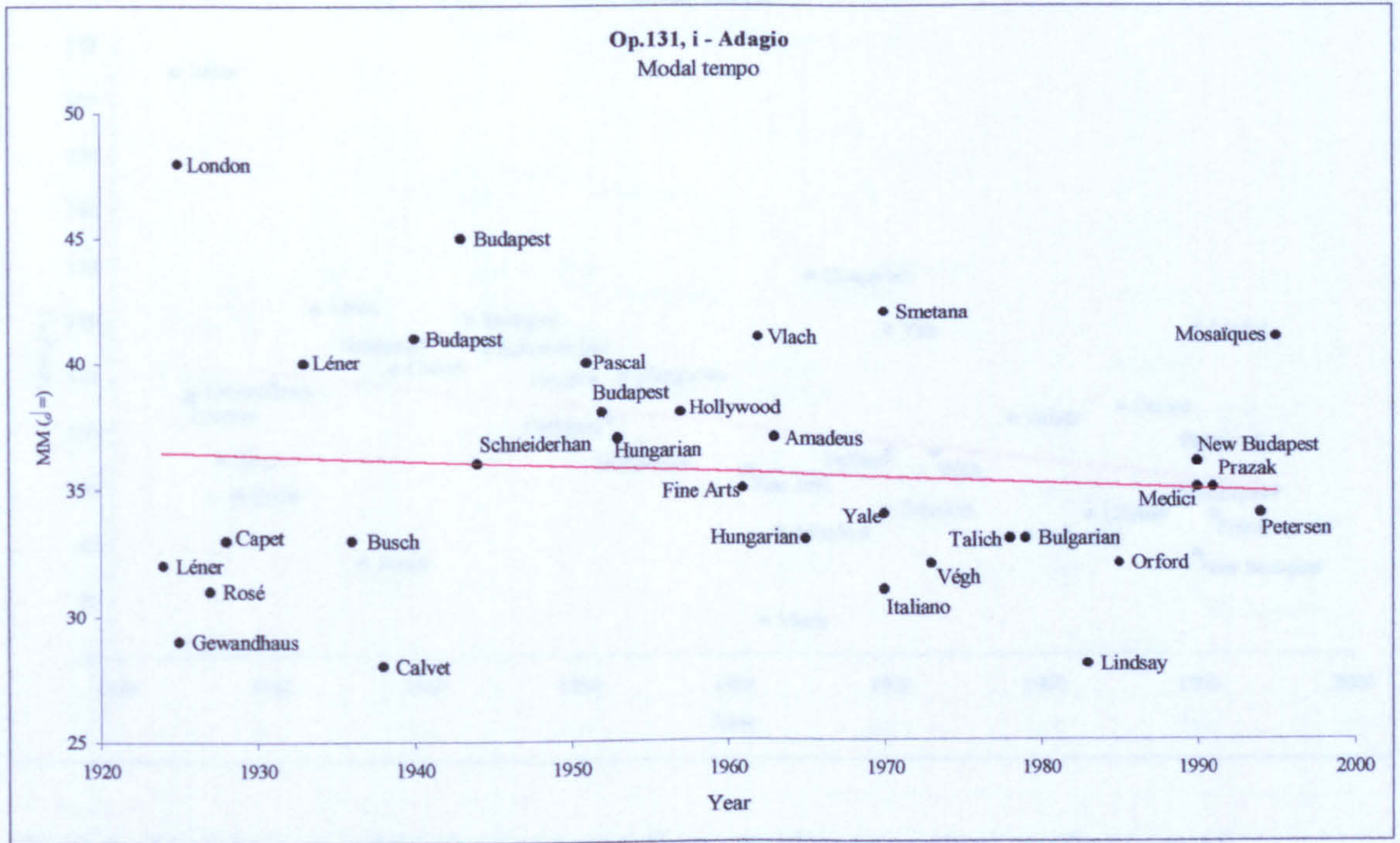


Fig. 3.1 - Modal tempo of first movement against year of performance

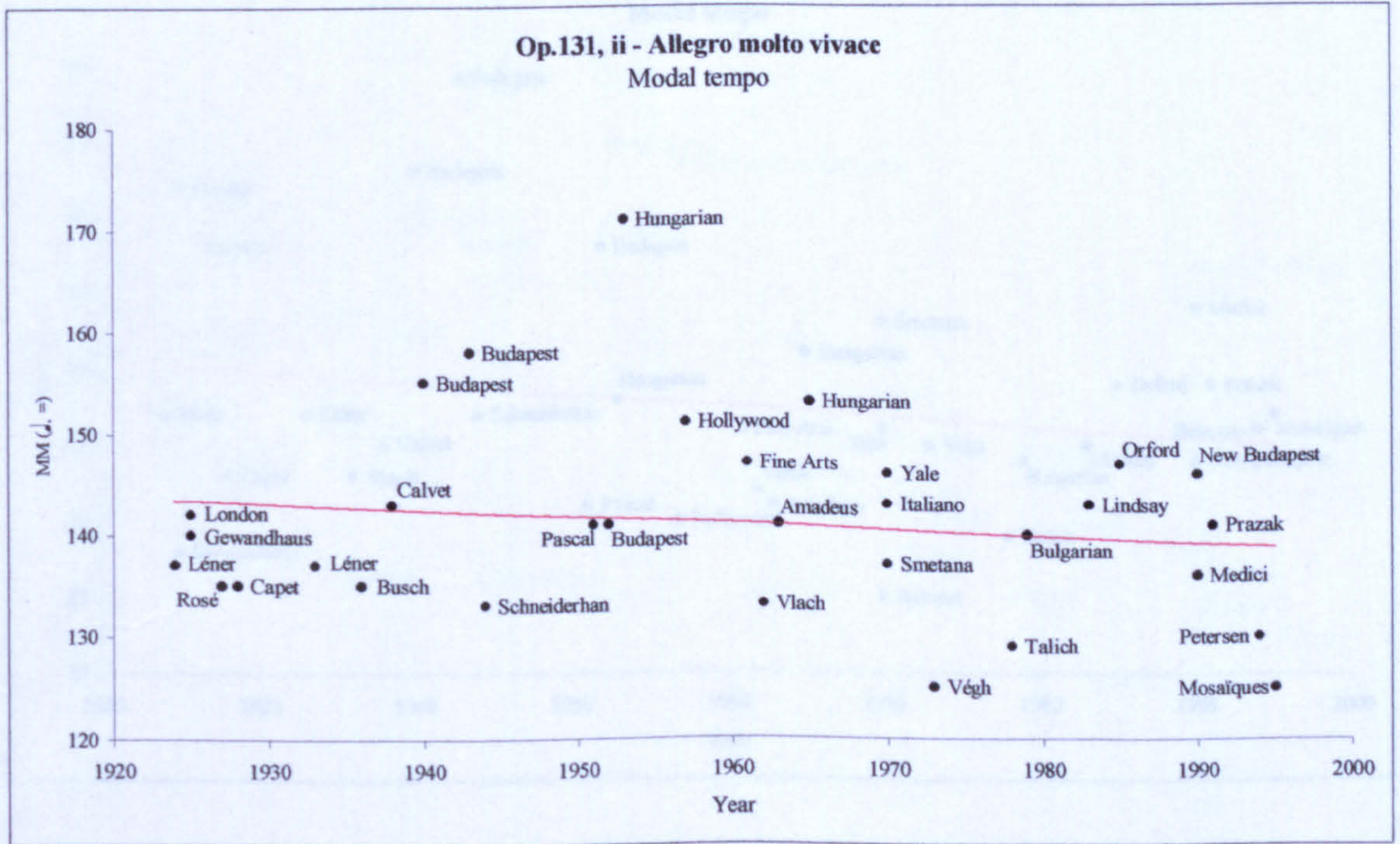


Fig. 3.2 - Modal tempo of second movement against year of performance

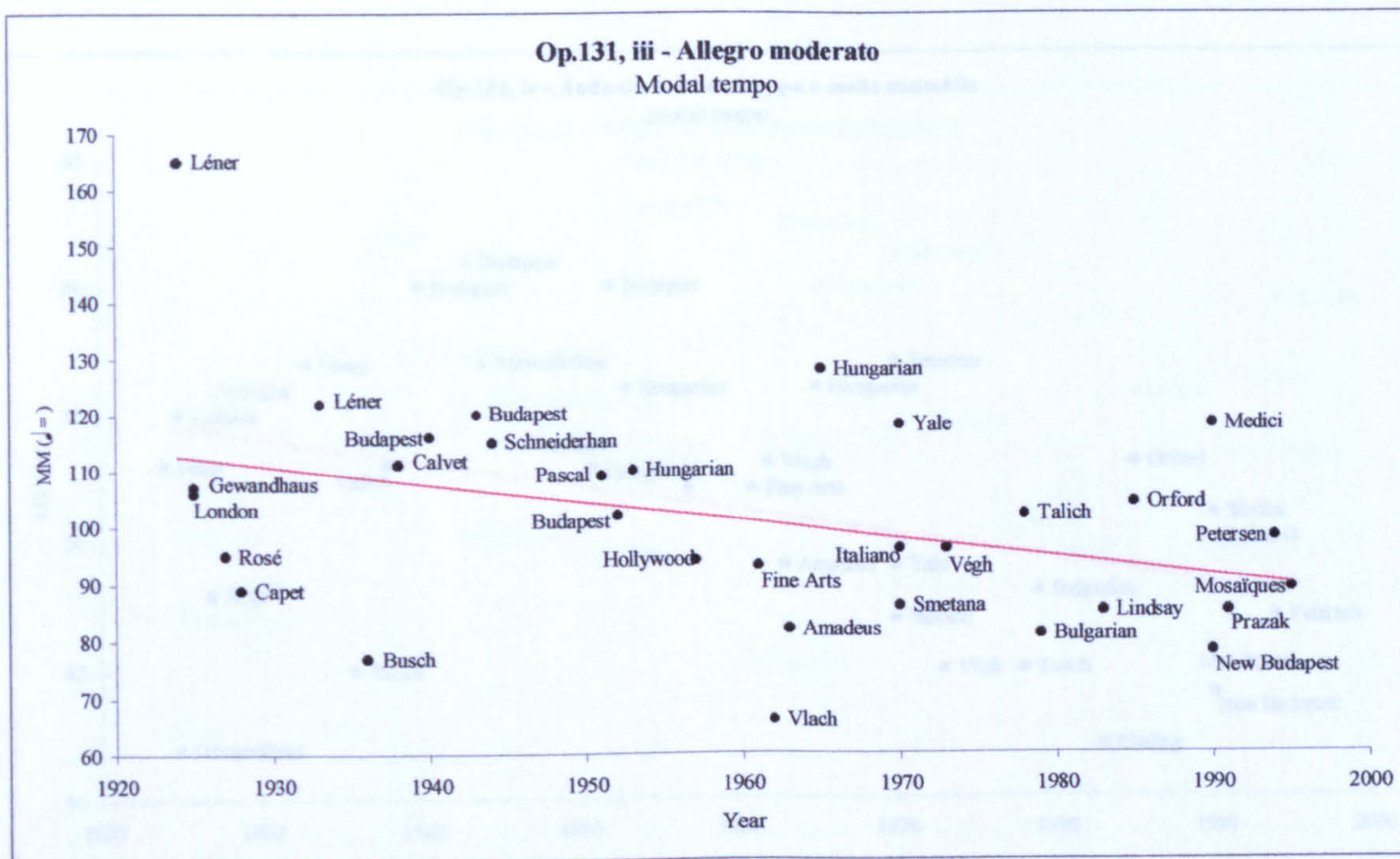


Fig. 3.3 - Modal tempo of third movement (allegro moderato section) against year of performance

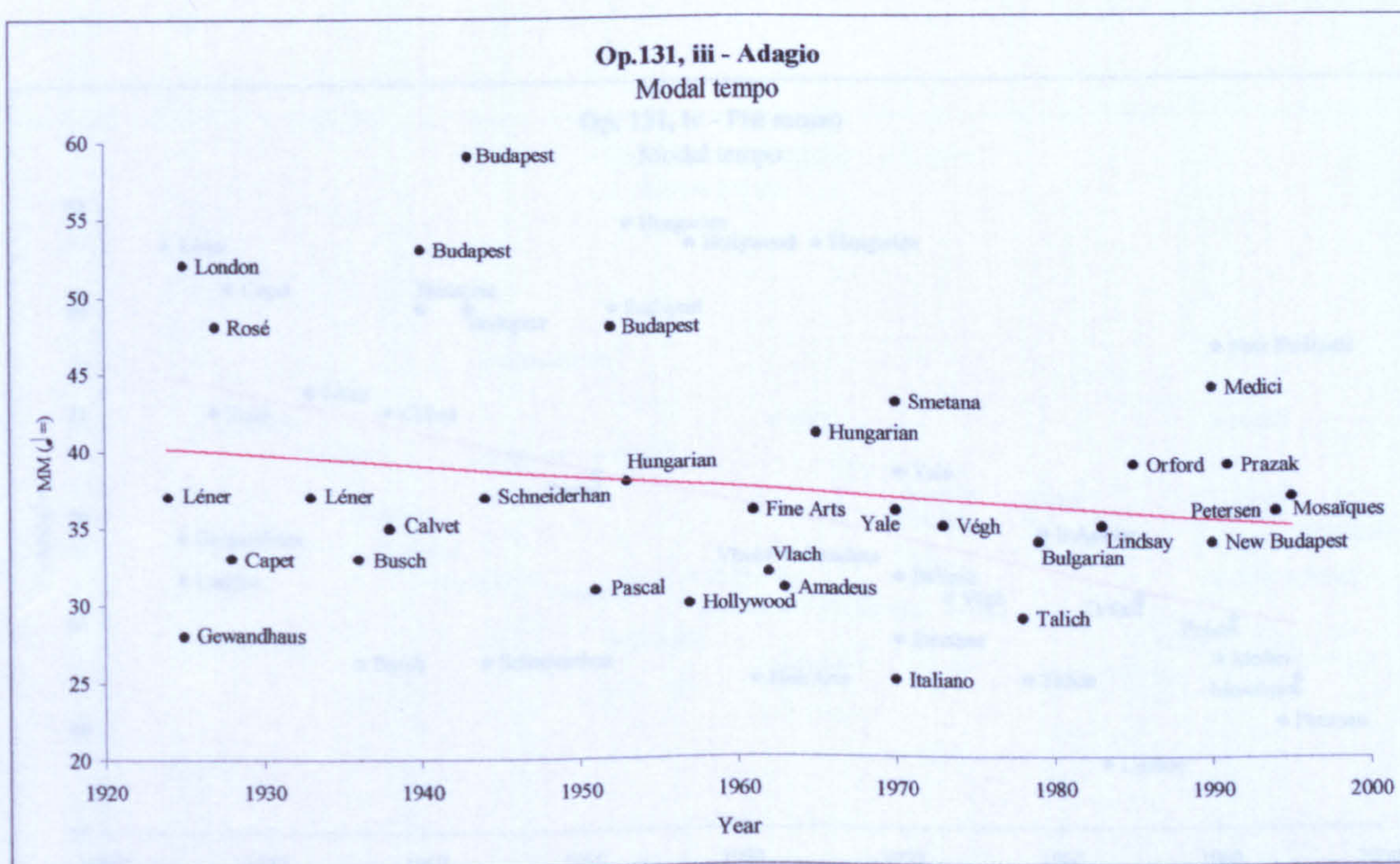


Fig. 3.4 - Modal tempo of third movement (adagio section) against year of performance

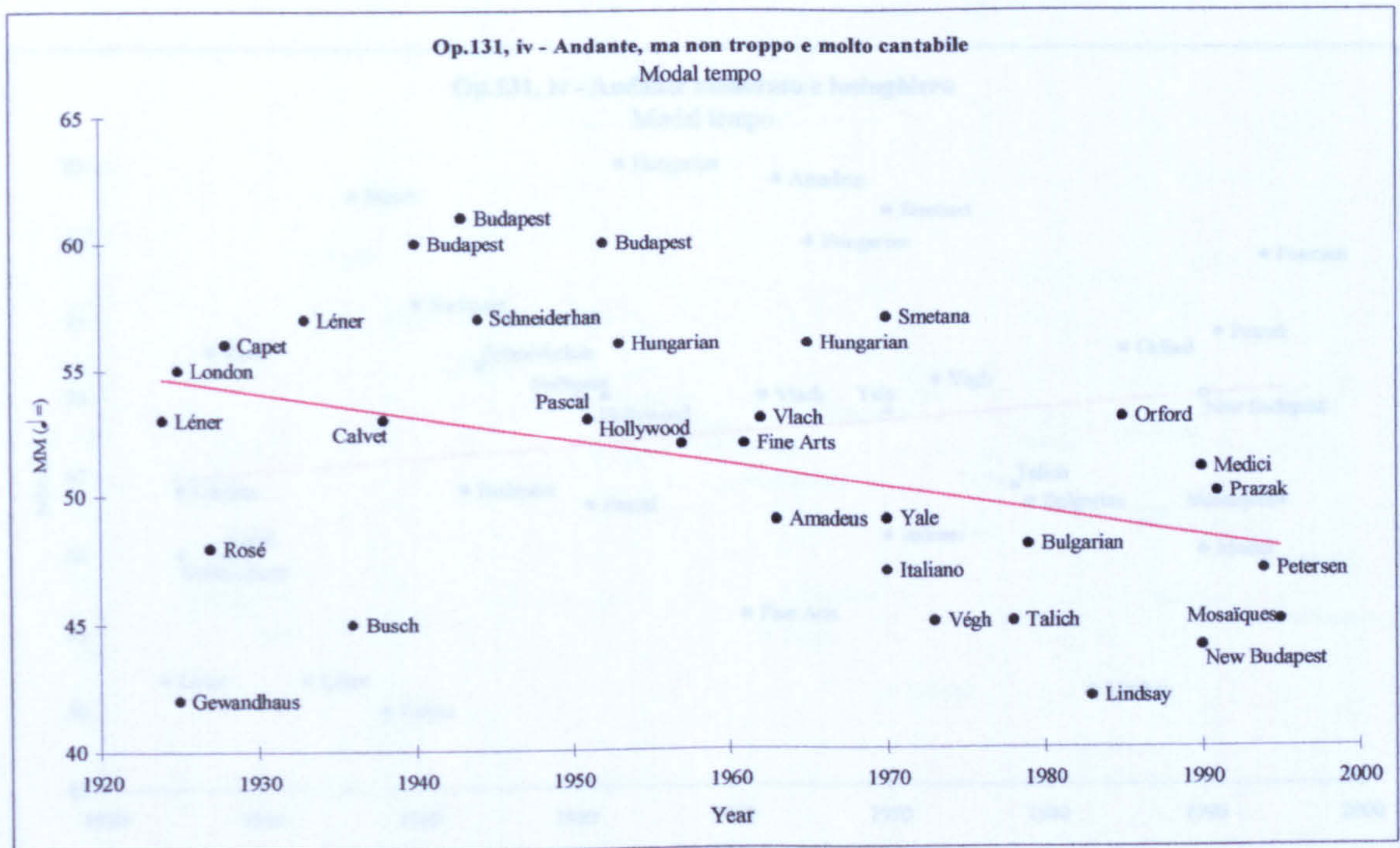


Fig. 3.5 - Modal tempo of fourth movement (theme and first variation) against year of performance

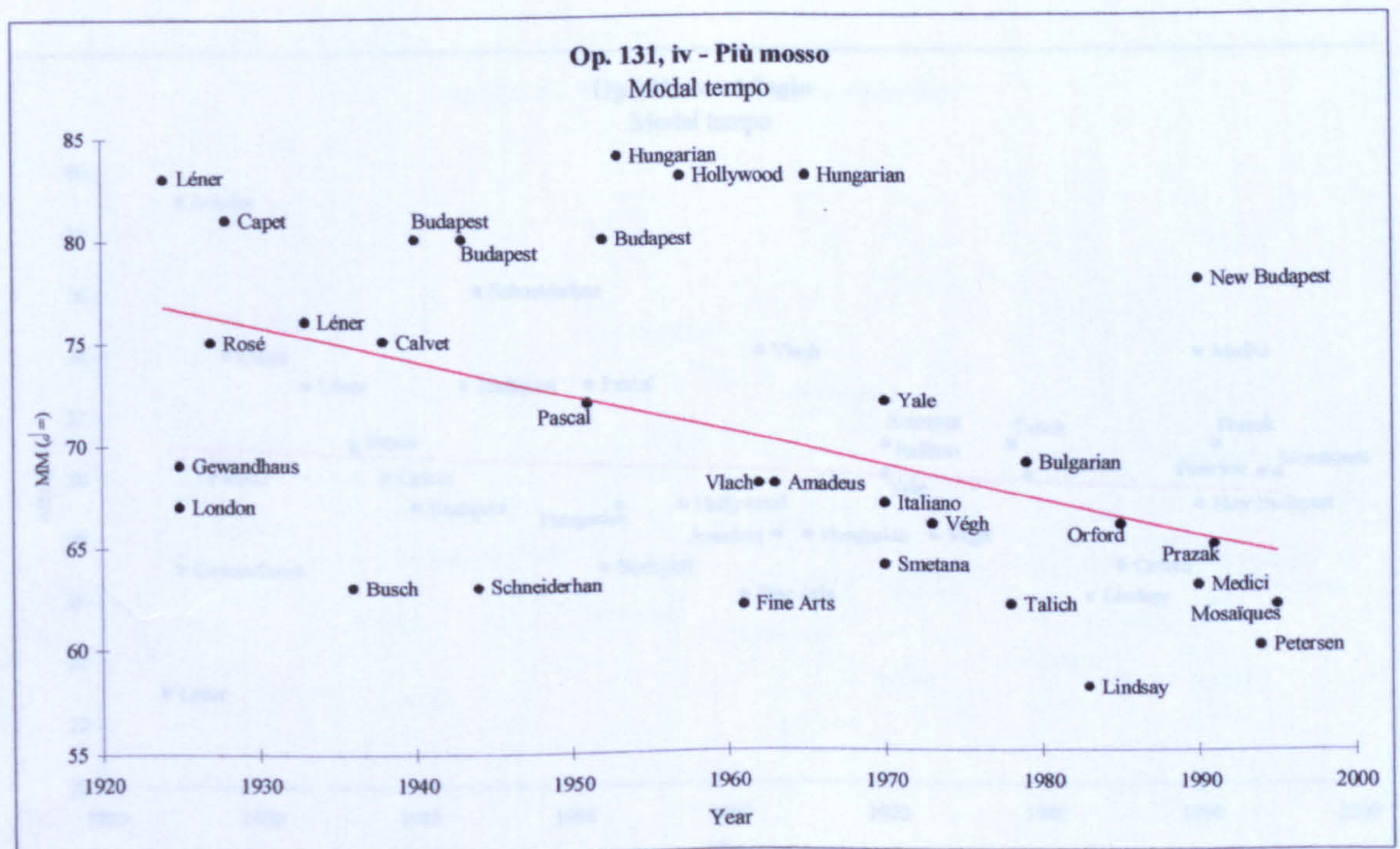


Fig. 3.6 - Modal tempo of fourth movement (second variation) against year of performance

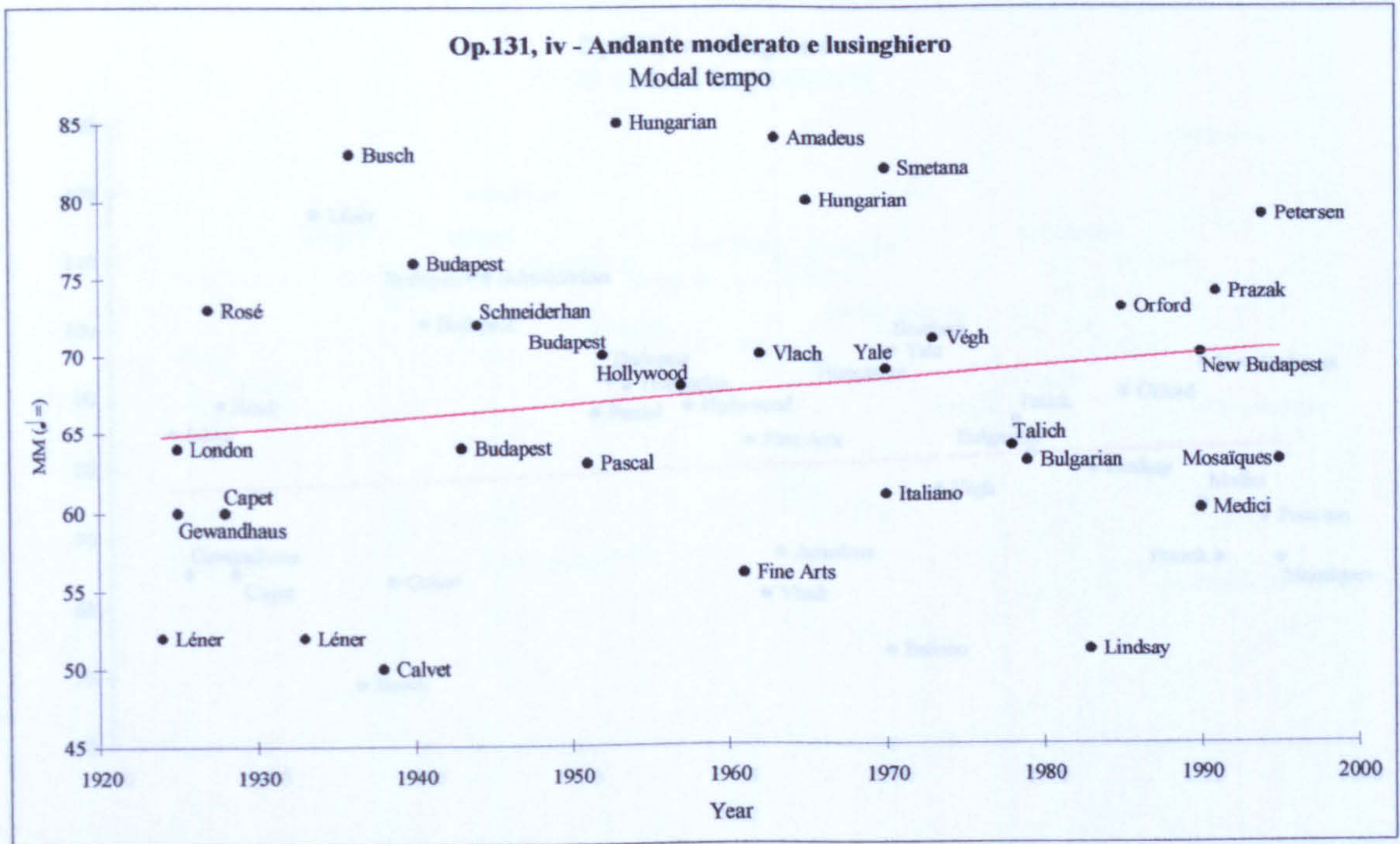


Fig. 3.7 - Modal tempo of fourth movement (third variation) against year of performance

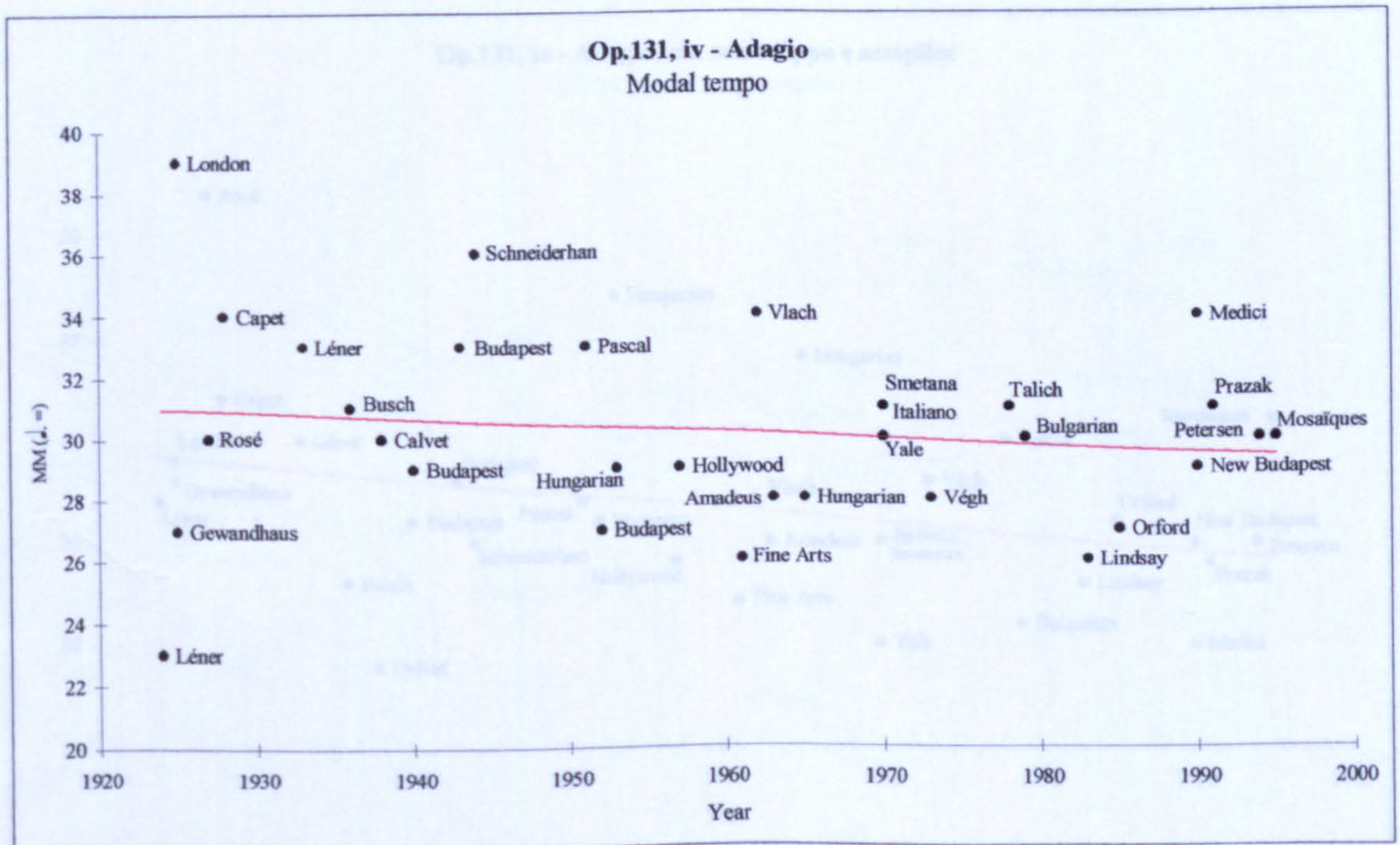


Fig. 3.8 - Modal tempo of fourth movement (fourth variation) against year of performance

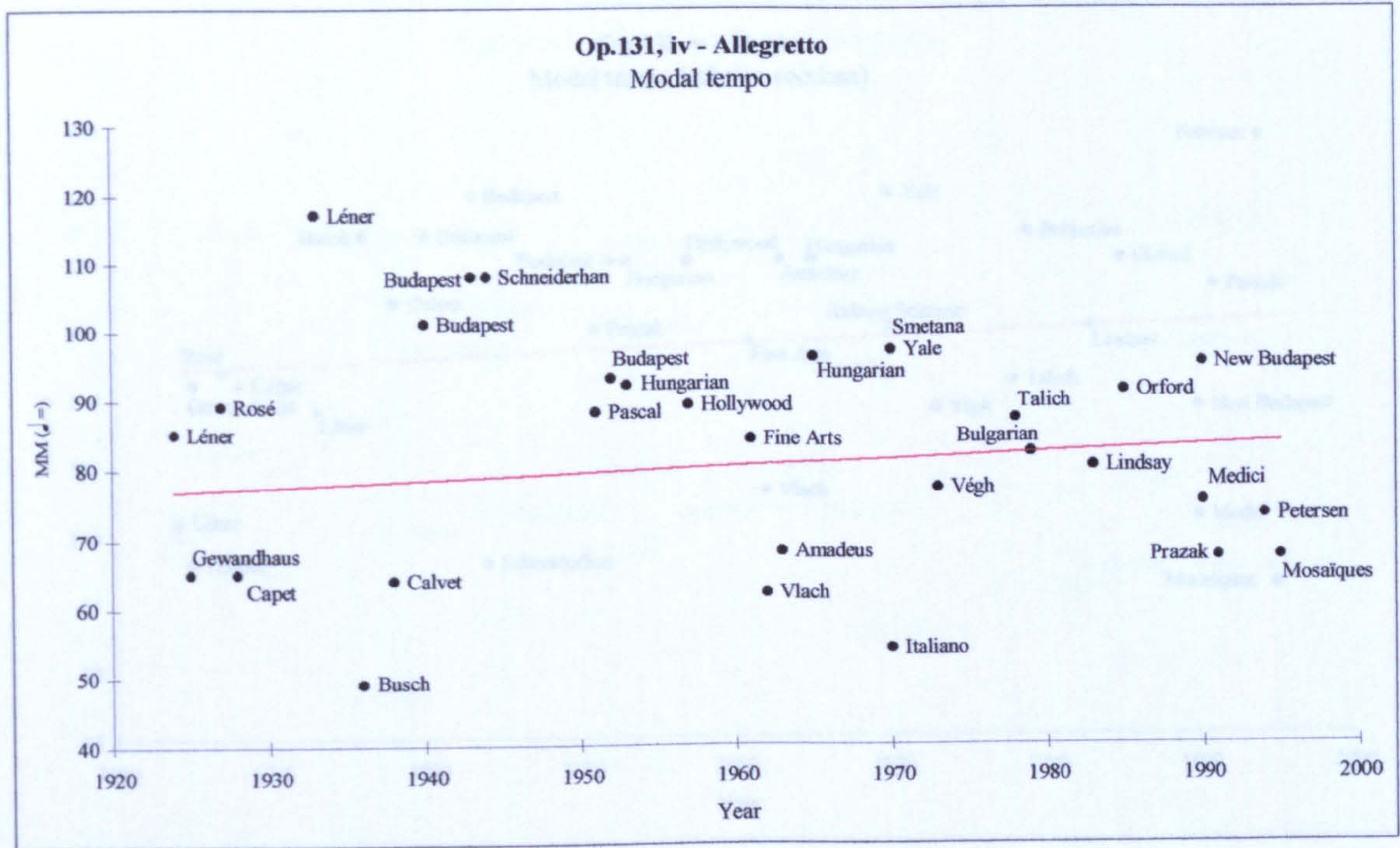


Fig. 3.9 - Modal tempo of fourth movement (fifth variation) against year of performance

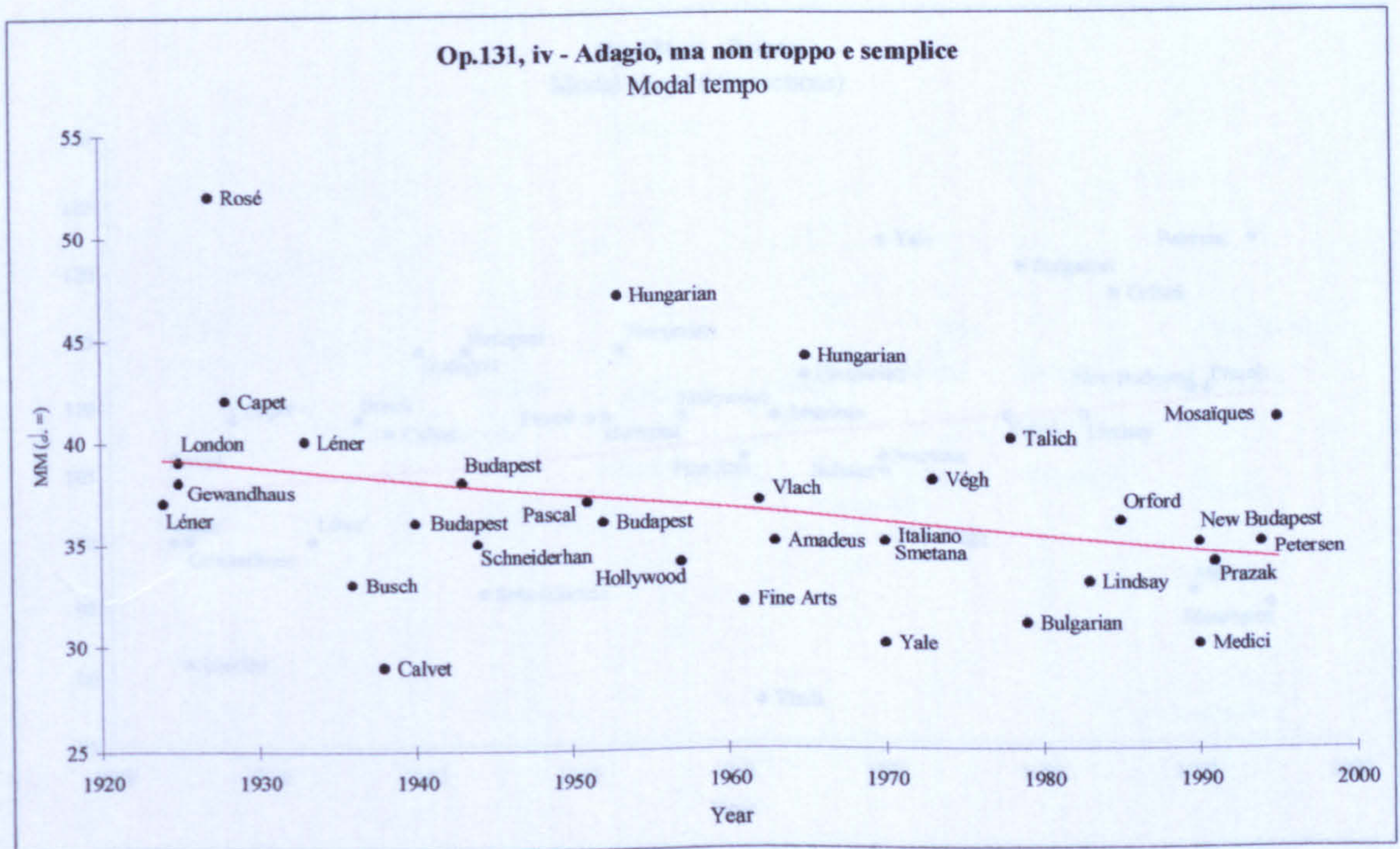


Fig. 3.10 - Modal tempo of fourth movement (sixth variation) against year of performance

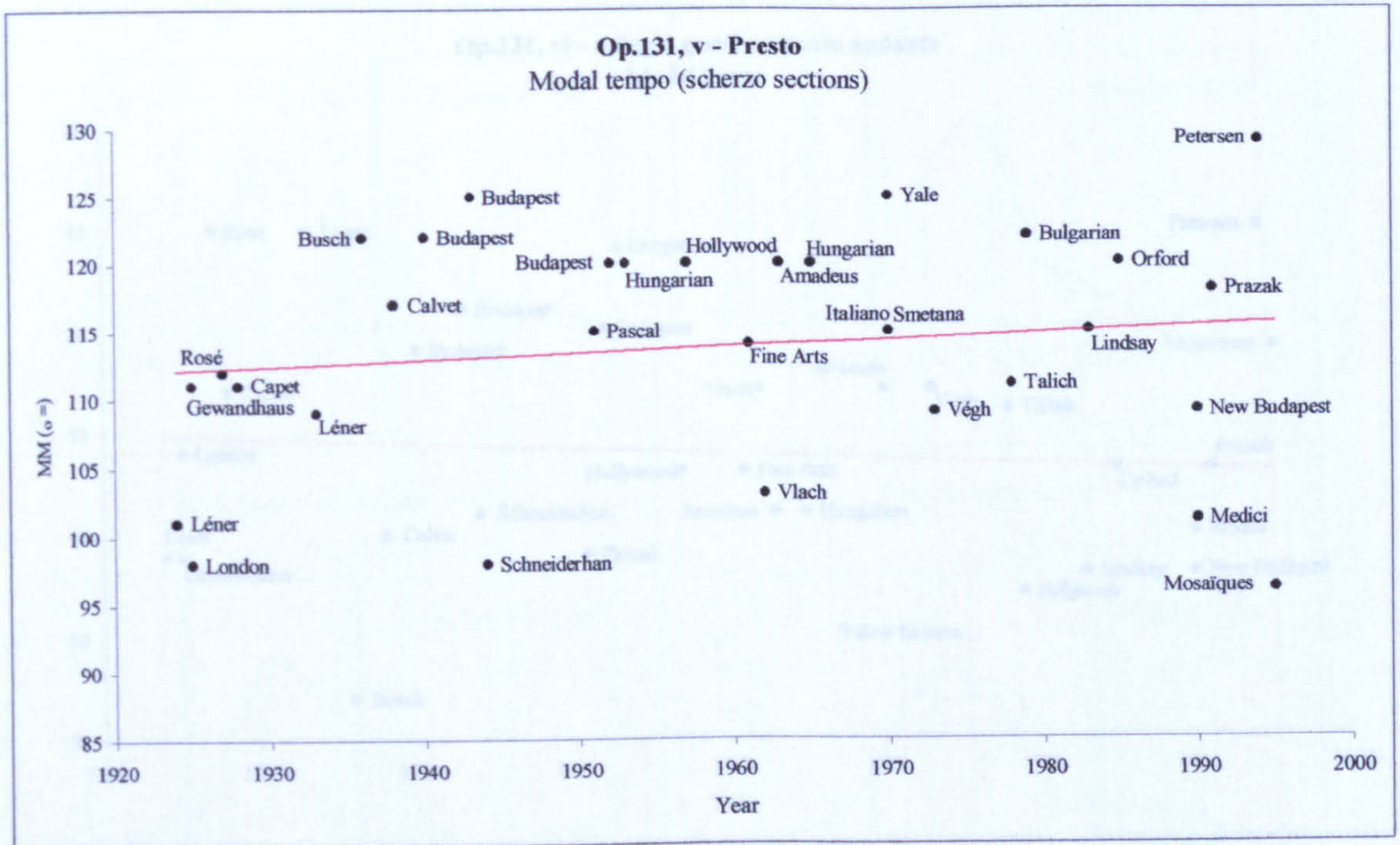


Fig. 3.11 - Modal tempo of fifth movement (scherzo sections) against year of performance

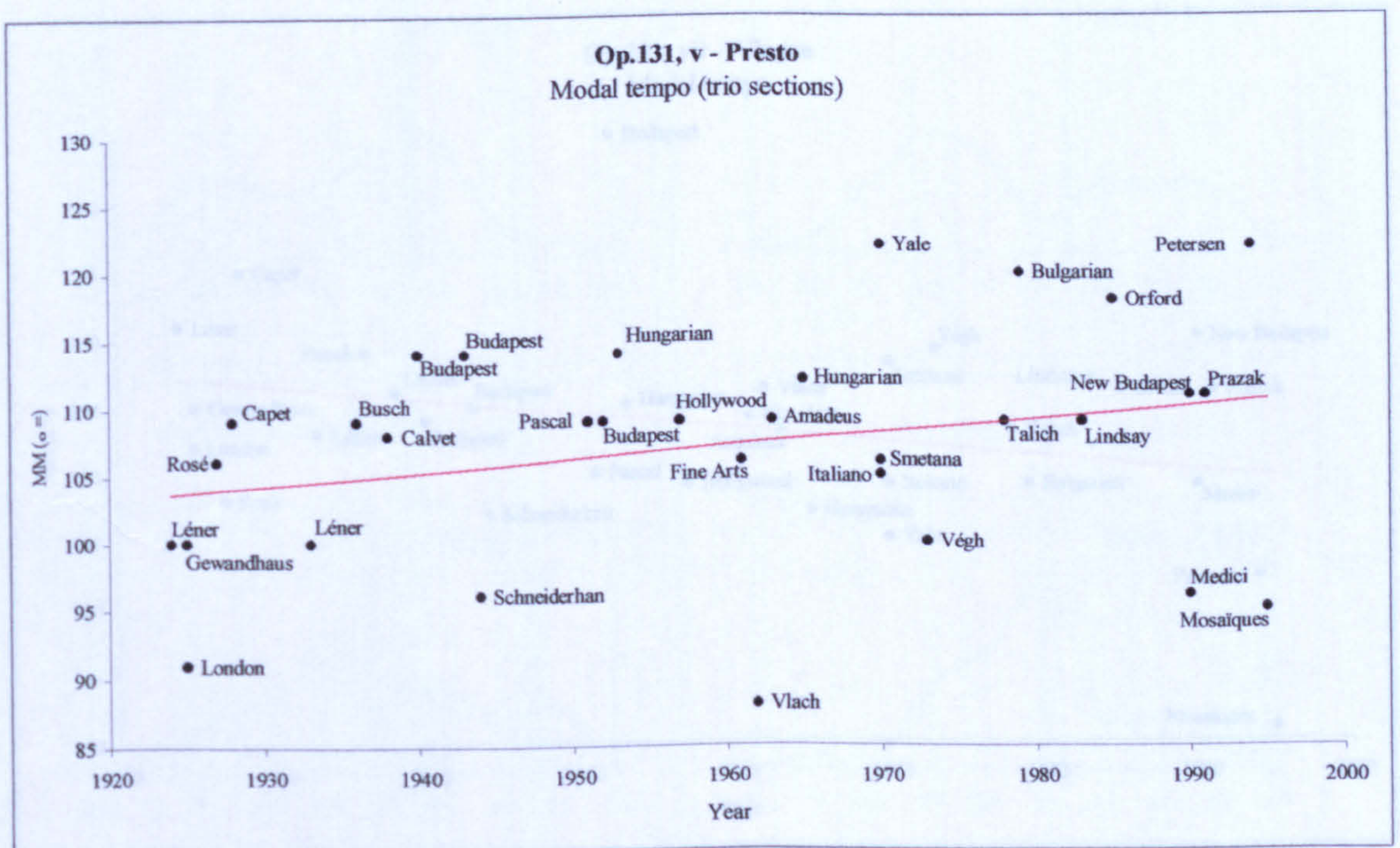


Fig. 3.12 - Modal tempo of fifth movement (trio sections) against year of performance

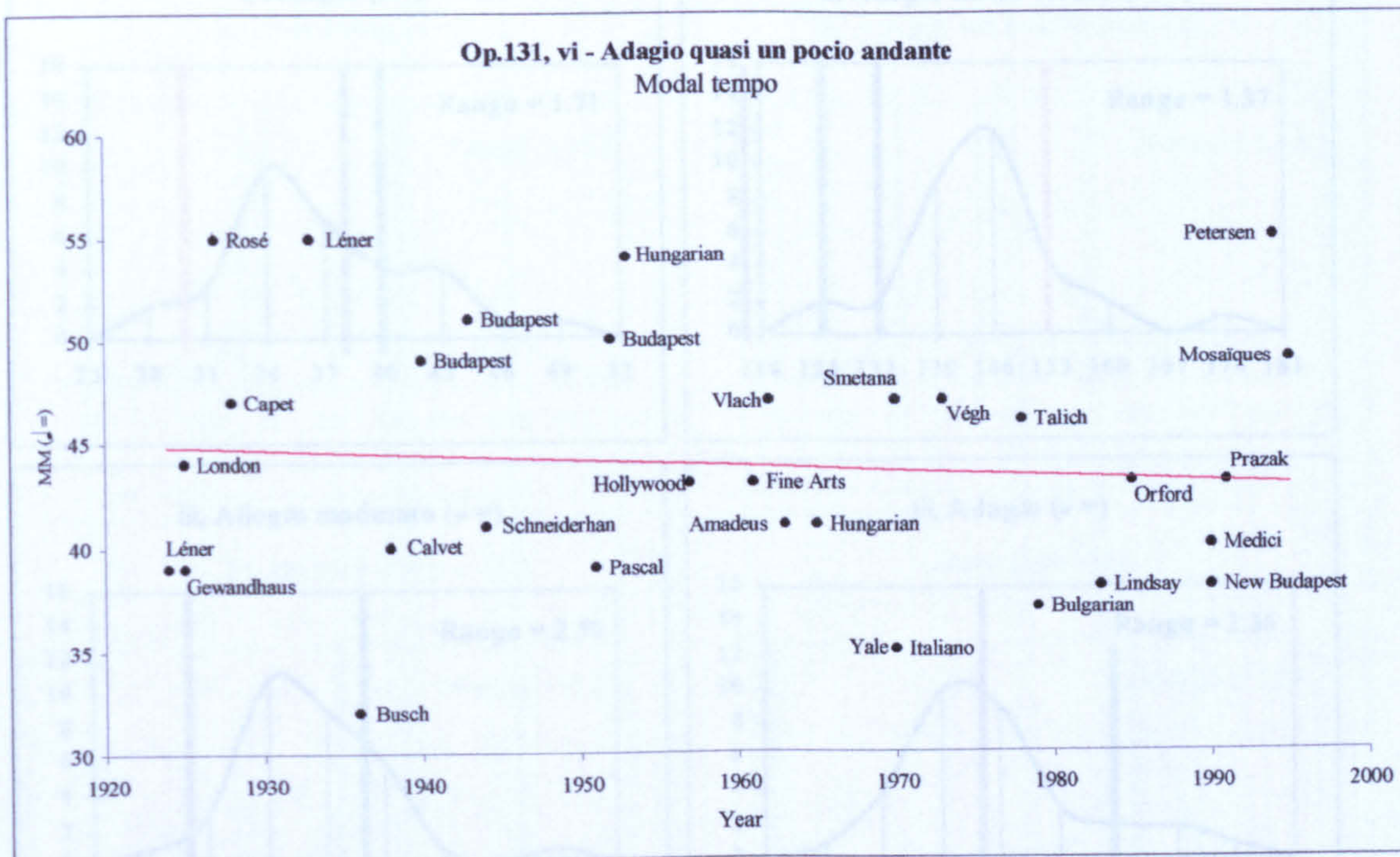


Fig. 3.13 - Modal tempo of sixth movement against year of performance

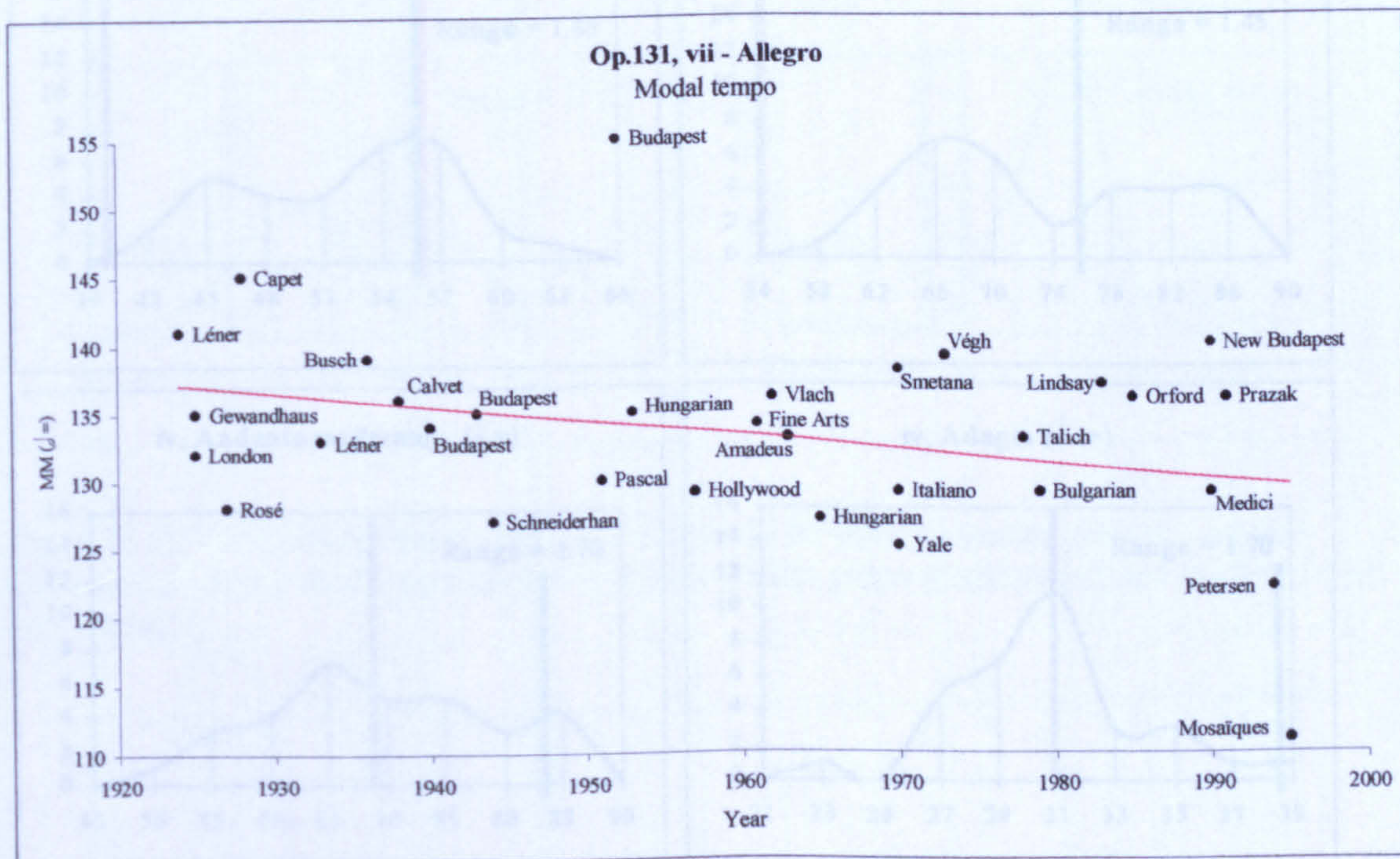


Fig. 3.14 - Modal tempo of seventh movement against year of performance

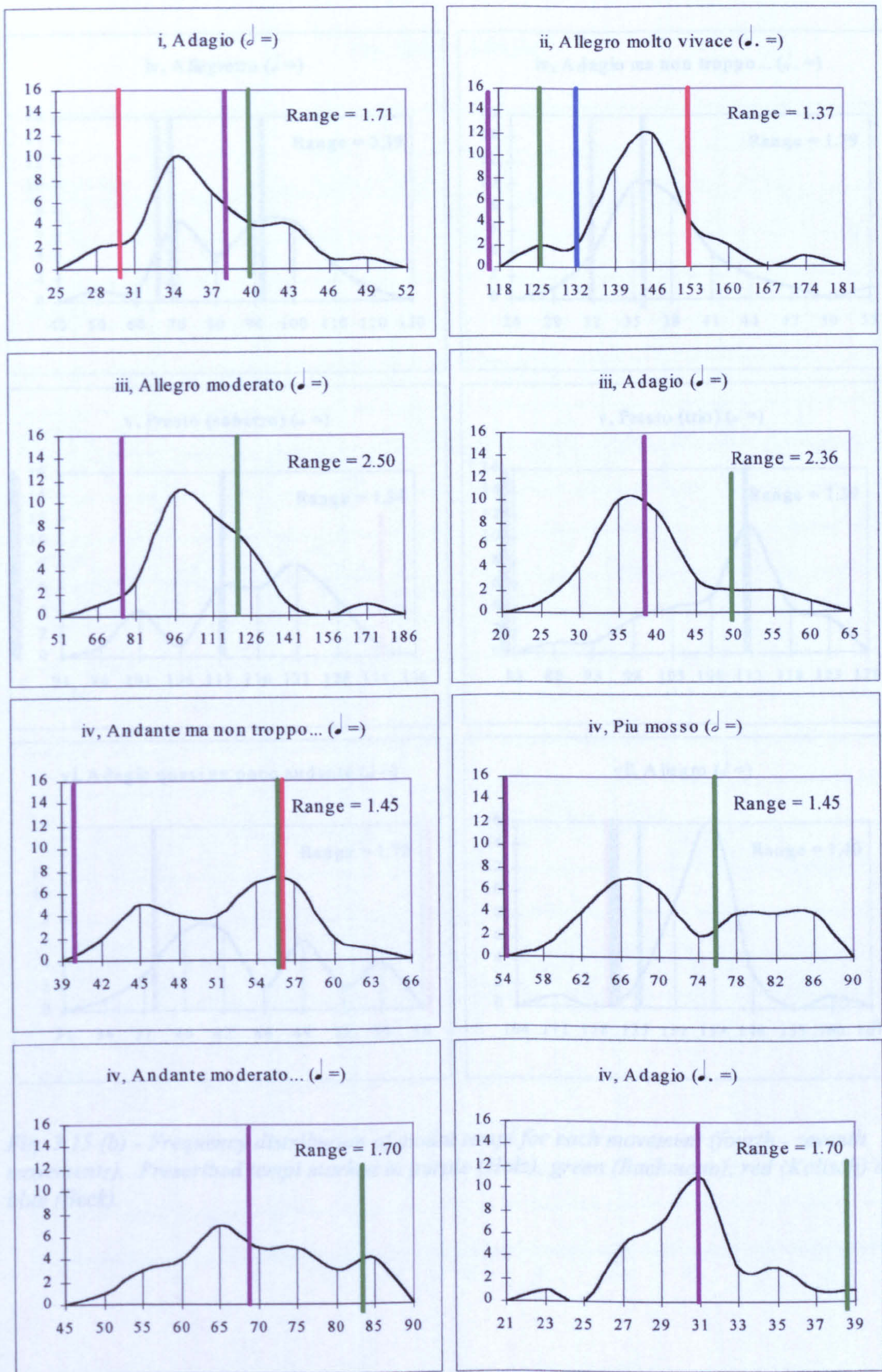


Fig. 3.15 (a) - Frequency distribution of modal tempi for each movement (first - fourth movements). Prescribed tempi marked in purple (Holz), green (Bachmann), red (Kolisch) and blue (Beck).

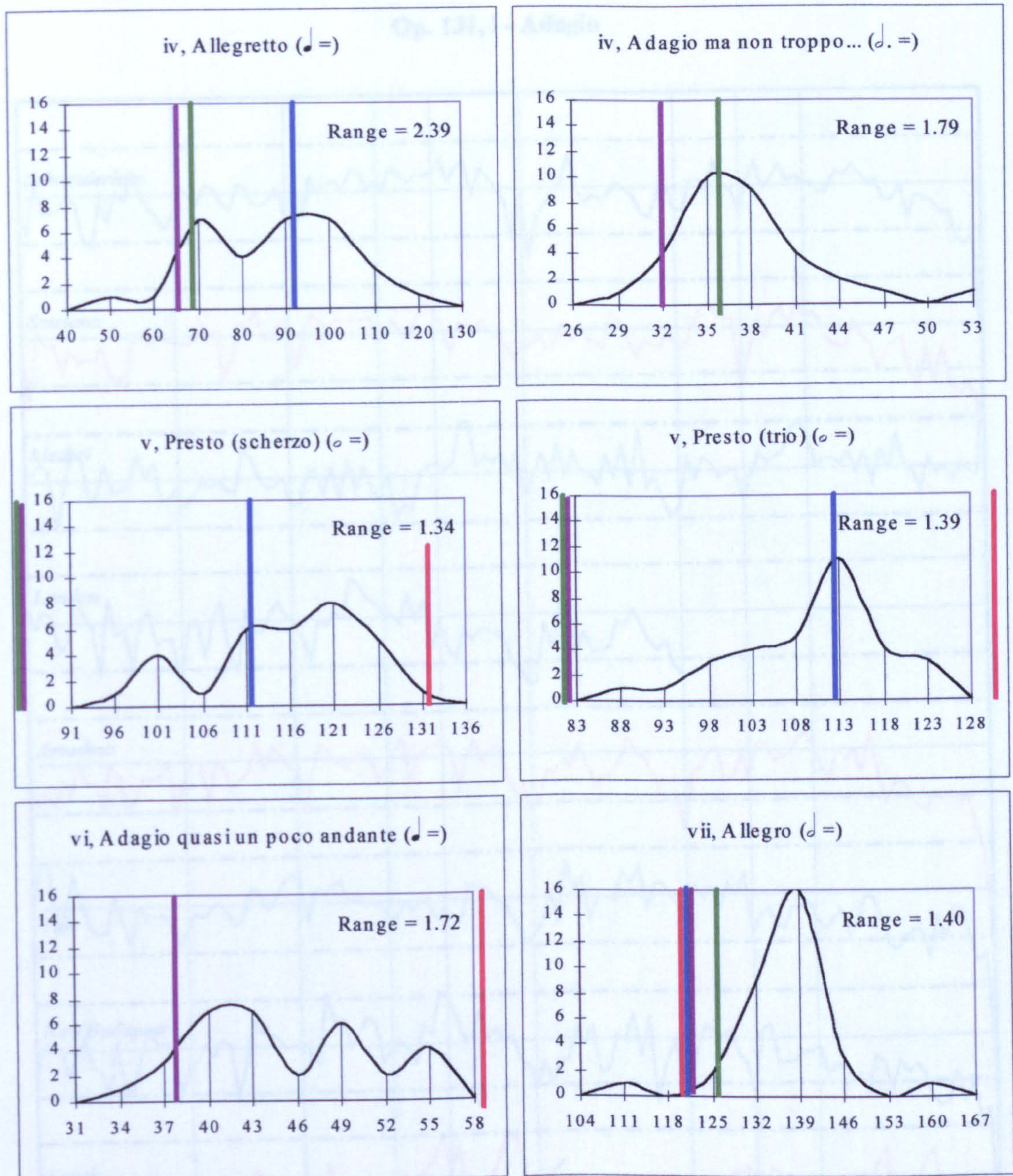


Fig. 3.15 (b) - Frequency distribution of modal tempi for each movement (fourth - seventh movements). Prescribed tempi marked in purple (Holz), green (Bachmann), red (Kolisch) and blue (Beck).

Op. 131, i - Adagio

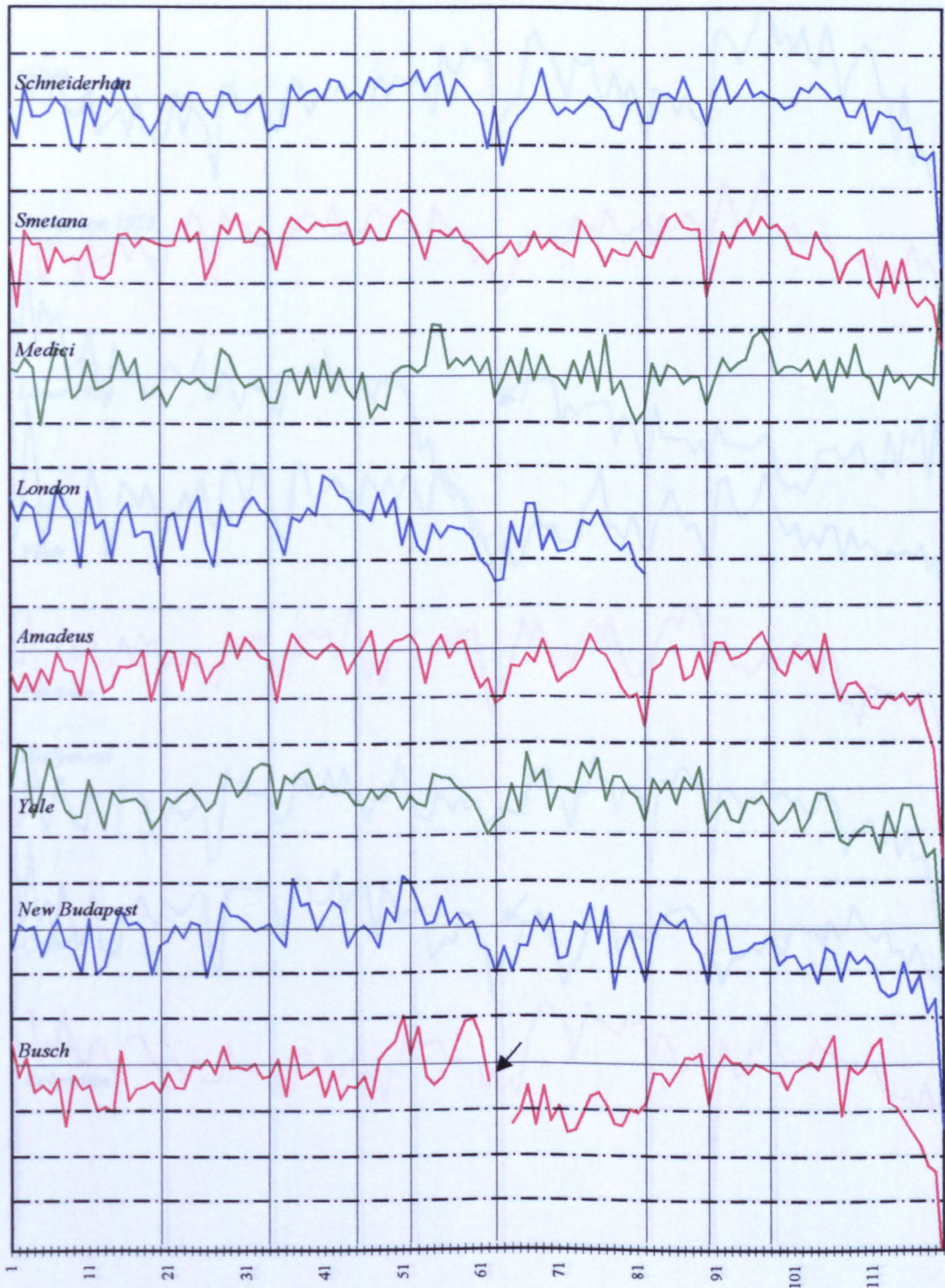


Fig. 4.1 (a) - First movement tempo maps, local bar tempi plotted as percentage difference from modal tempo. Side breaks in shellac 78 rpm recordings are indicated by a diagonal arrow and a break in the tempo graph line.

Op. 131, i - Adagio

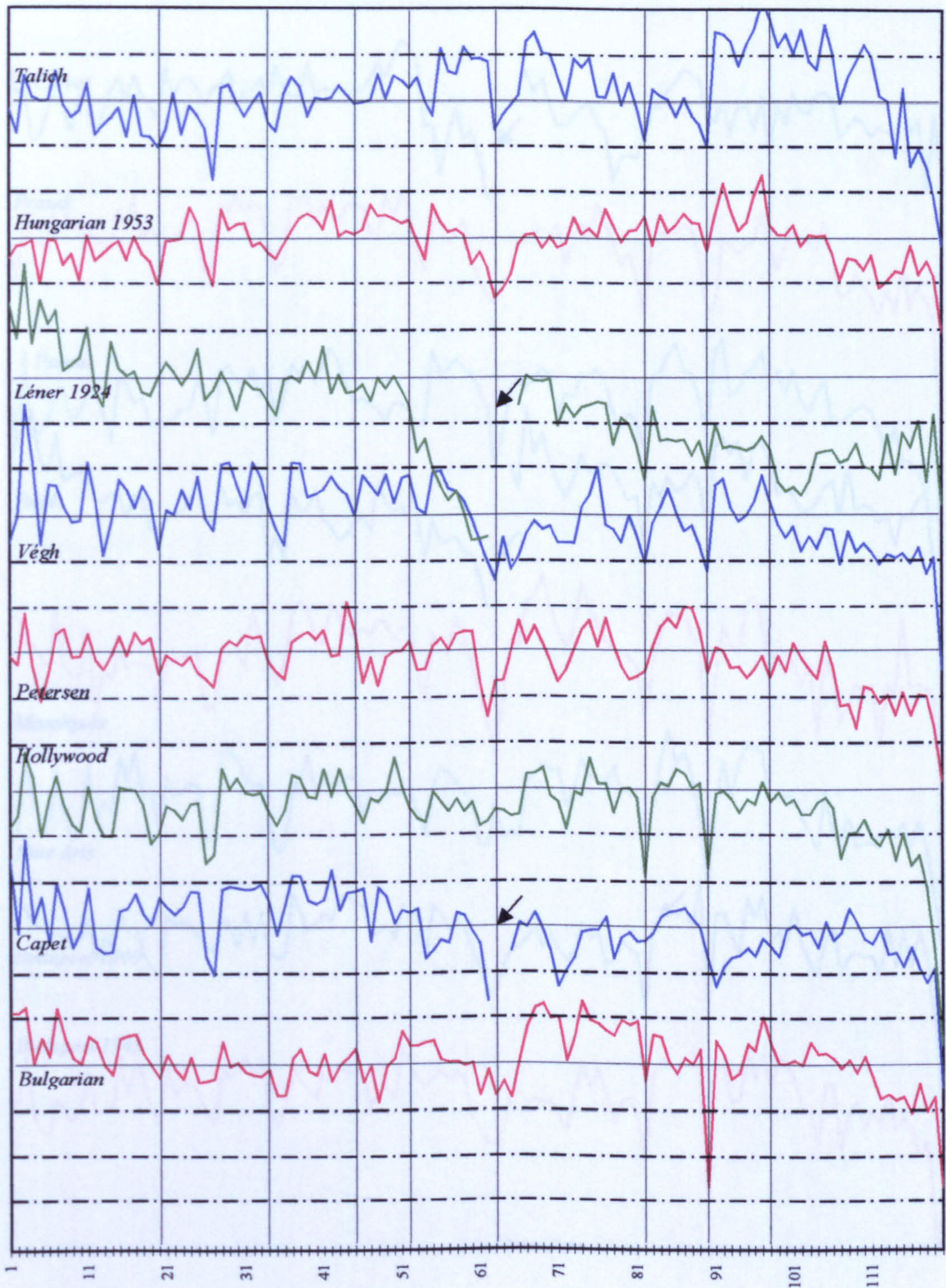


Fig. 4.1 (b) - First movement tempo maps, local bar tempi plotted as percentage difference from modal tempo. Side breaks in shellac 78 rpm recordings are indicated by a diagonal arrow and a break in the tempo graph line.

Op. 131, i - Adagio

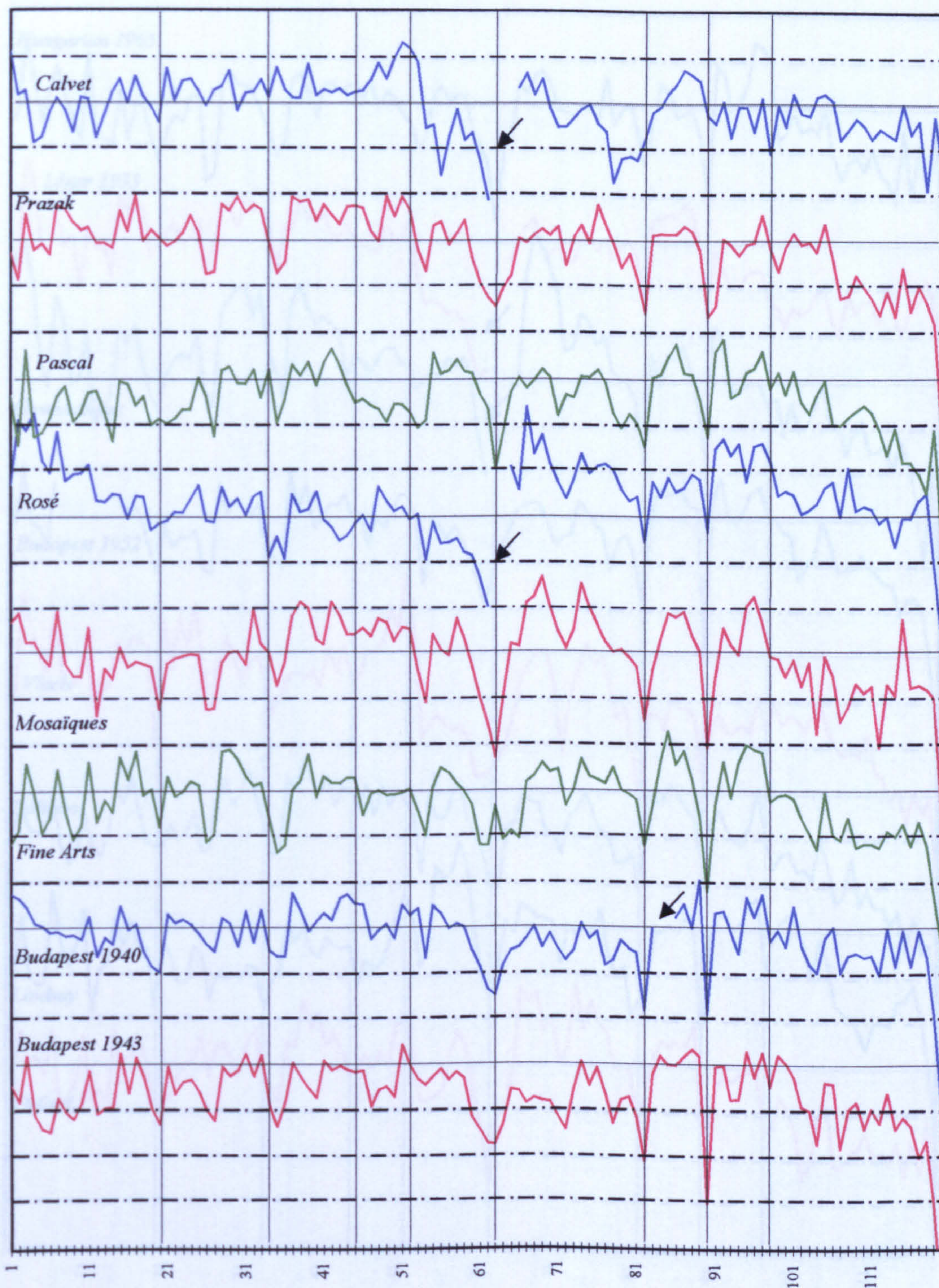


Fig. 4.1 (c) - First movement tempo maps, local bar tempi plotted as percentage difference from modal tempo. Side breaks in shellac 78 rpm recordings are indicated by a diagonal arrow and a break in the tempo graph line.

Op. 131, i - Adagio

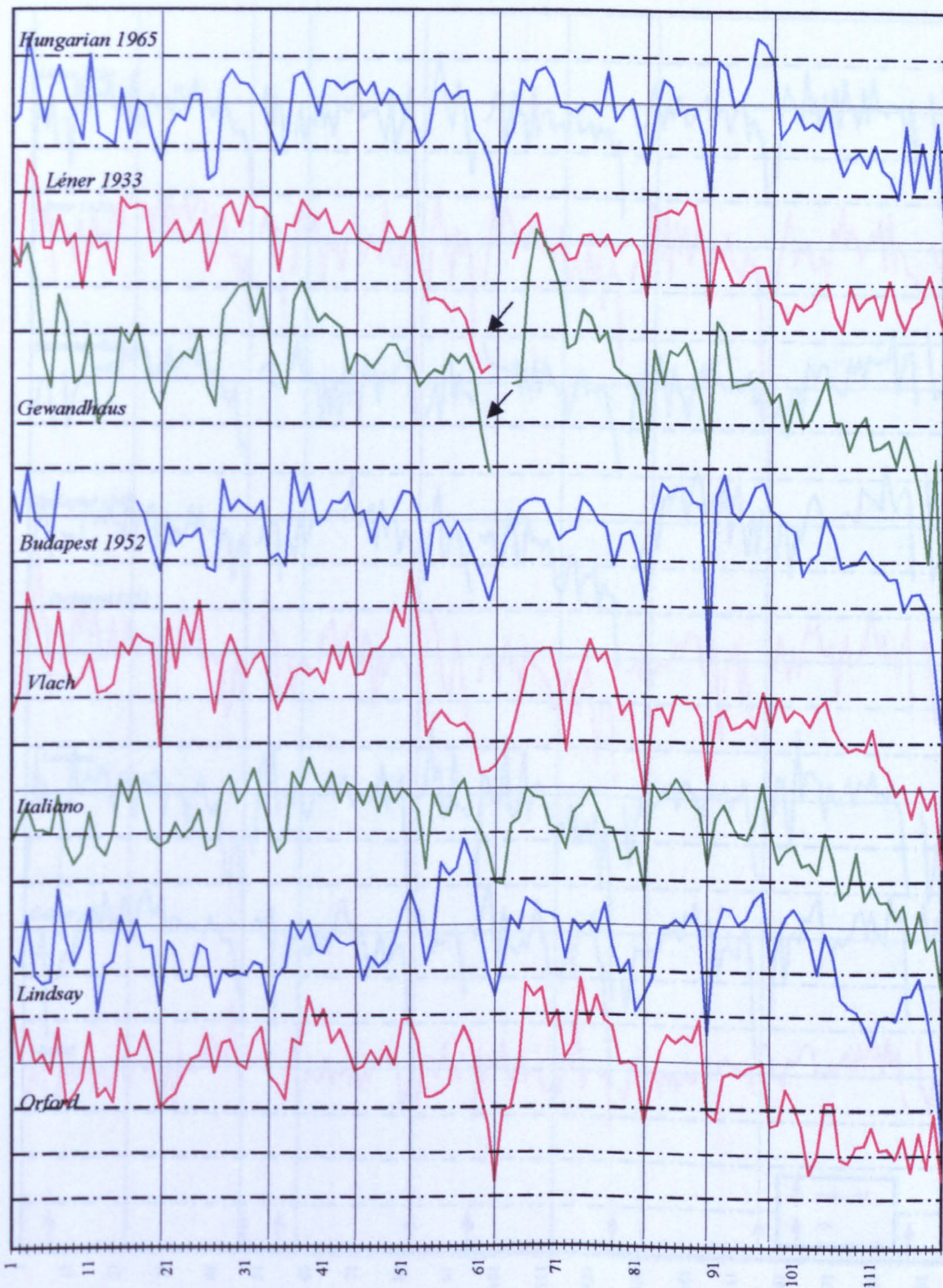


Fig. 4.1 (d) - First movement tempo maps, local bar tempi plotted as percentage difference from modal tempo. Side breaks in shellac 78 rpm recordings are indicated by a diagonal arrow and a break in the tempo graph line.

Op. 131, ii - Allegro molto vivace

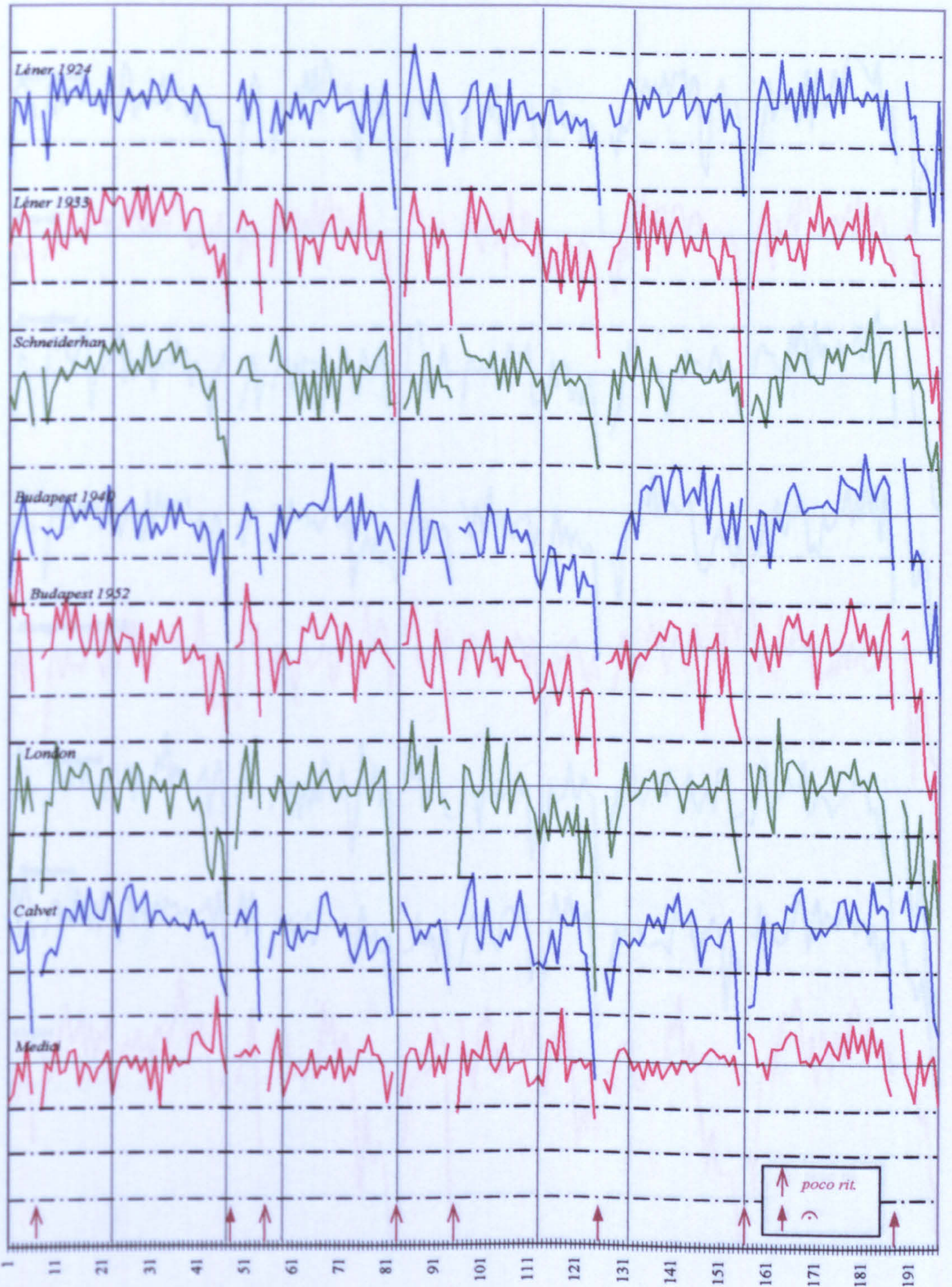


Fig. 4.2 (a) - Second movement tempo maps, local bar tempi plotted as percentage difference from modal tempo; bars with marked tempo change omitted

Op. 131, ii - Allegro molto vivace

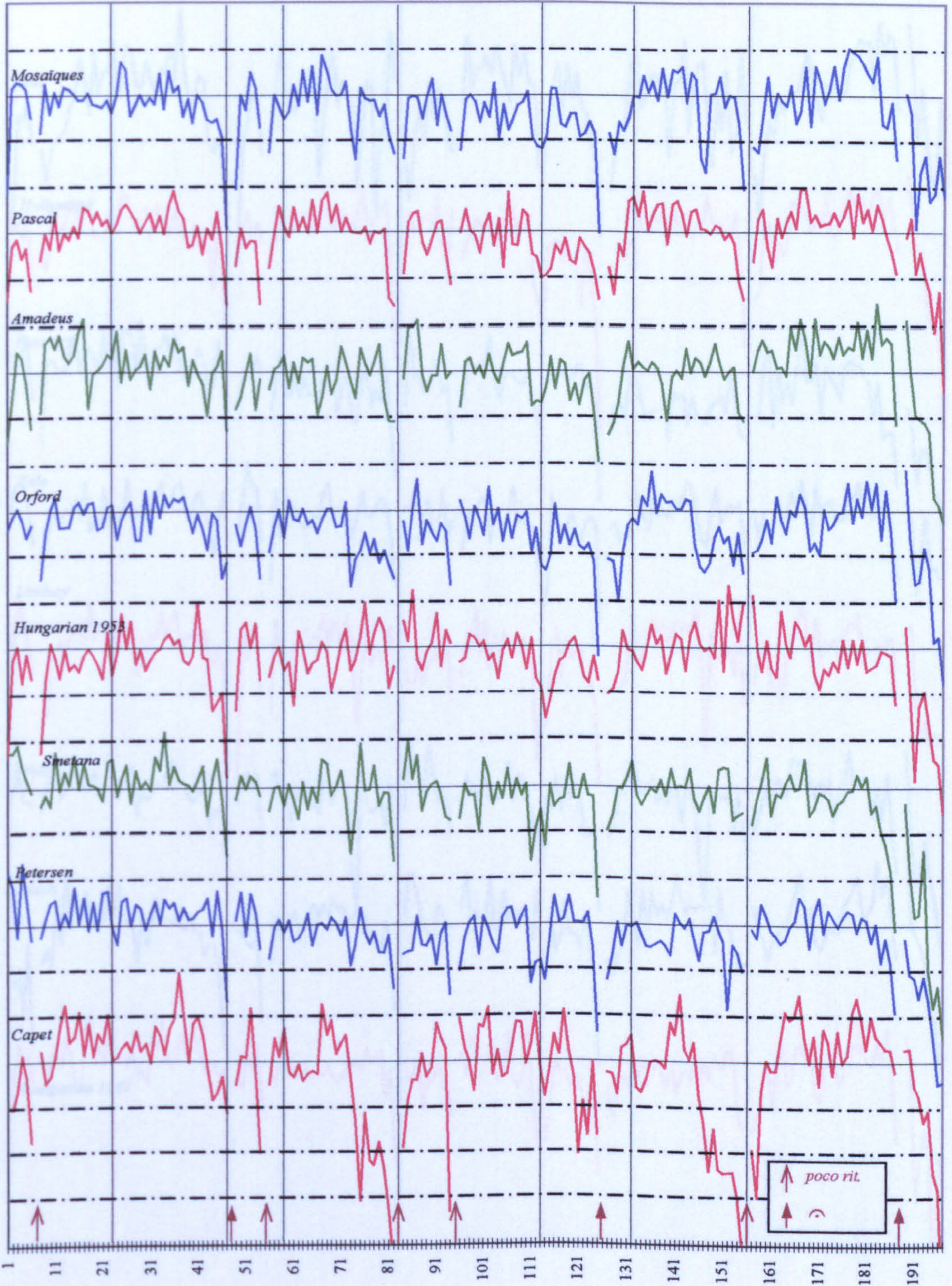


Fig. 4.2 (b) - Second movement tempo maps, local bar tempi plotted as percentage difference from modal tempo; bars with marked tempo change omitted

Op. 131, ii - Allegro molto vivace

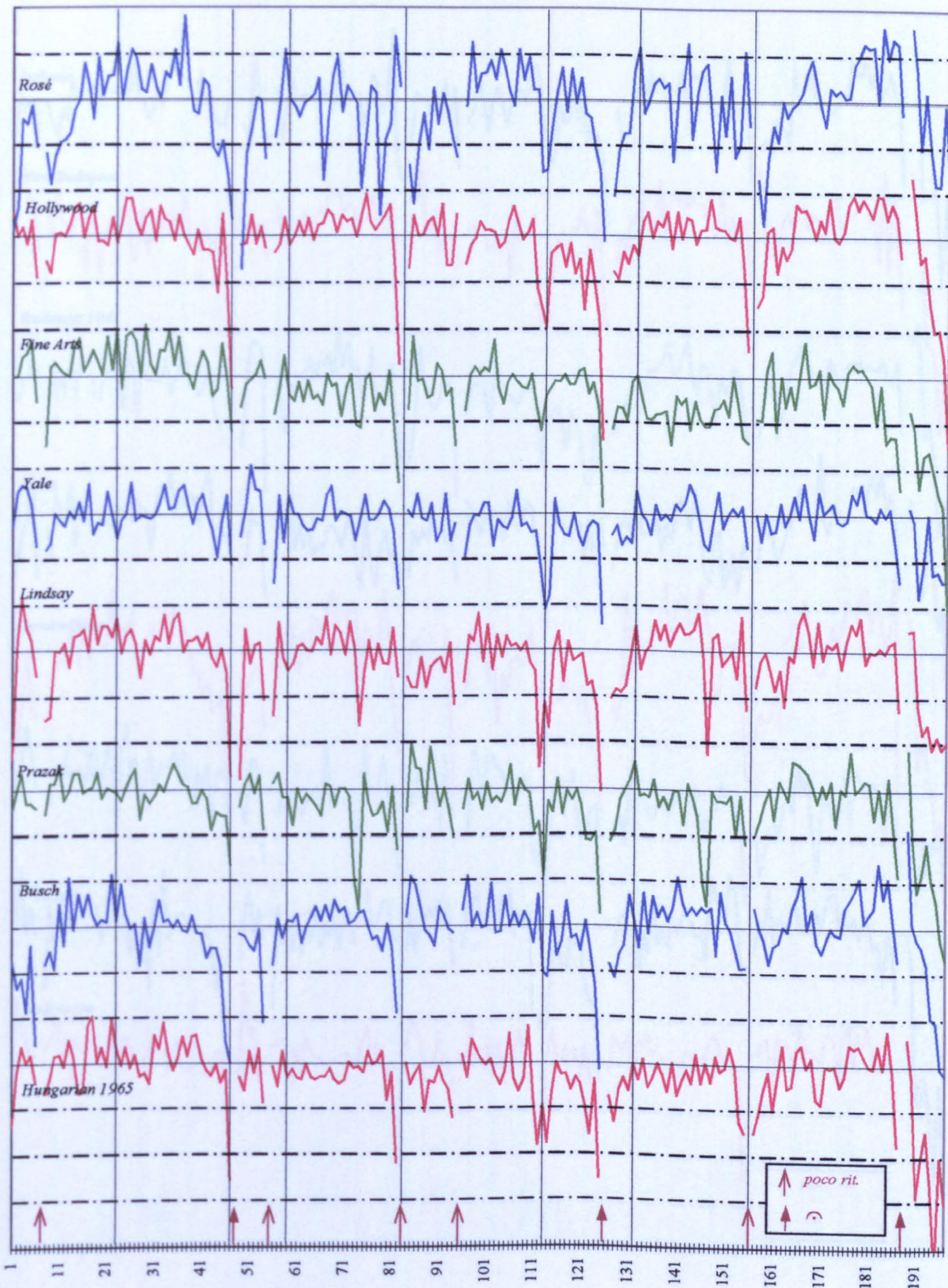


Fig. 4.2 (c) - Second movement tempo maps, local bar tempi plotted as percentage difference from modal tempo; bars with marked tempo change omitted

Op. 131, ii - Allegro molto vivace

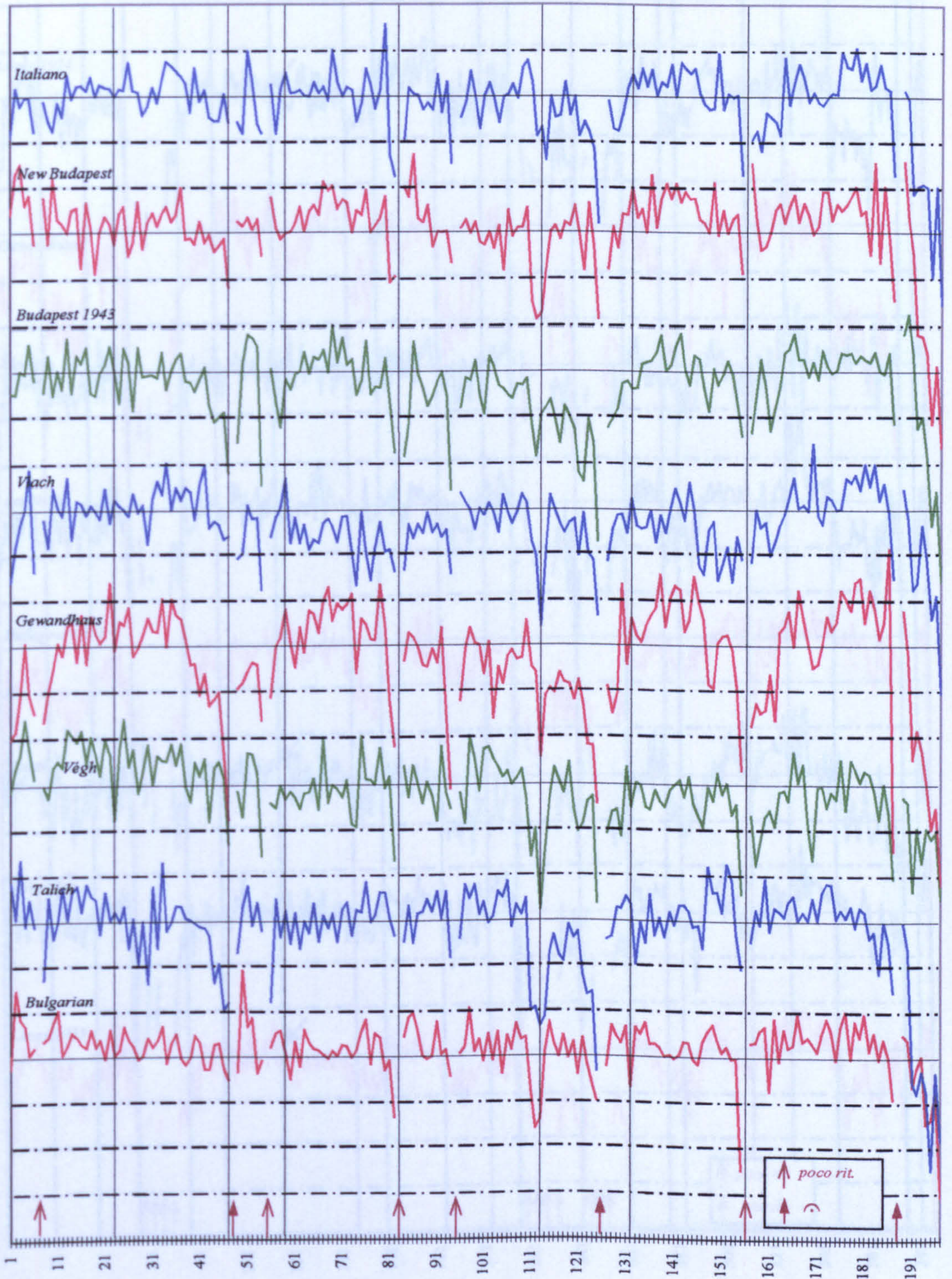


Fig. 4.2 (d) - Second movement tempo maps, local bar tempi plotted as percentage difference from modal tempo; bars with marked tempo change omitted

Op. 131, vii - Allegro

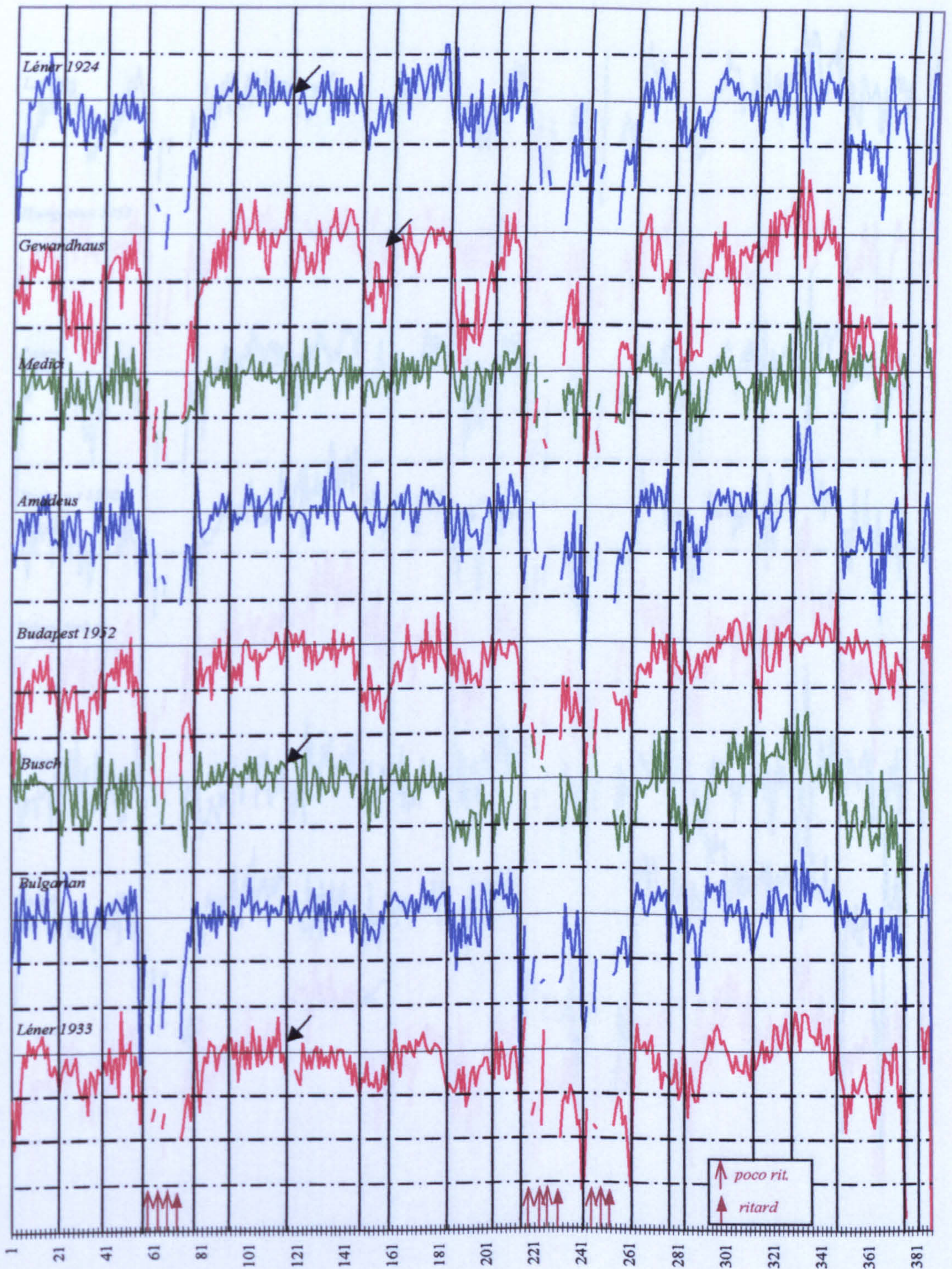


Fig. 4.3 (a) - Seventh movement tempo maps, local bar tempi plotted as percentage difference from modal tempo; bars with marked tempo change omitted. Side breaks in shellac 78 rpm recordings are indicated by a diagonal arrow and a break in the tempo graph line.

Op. 131, vii - Allegro

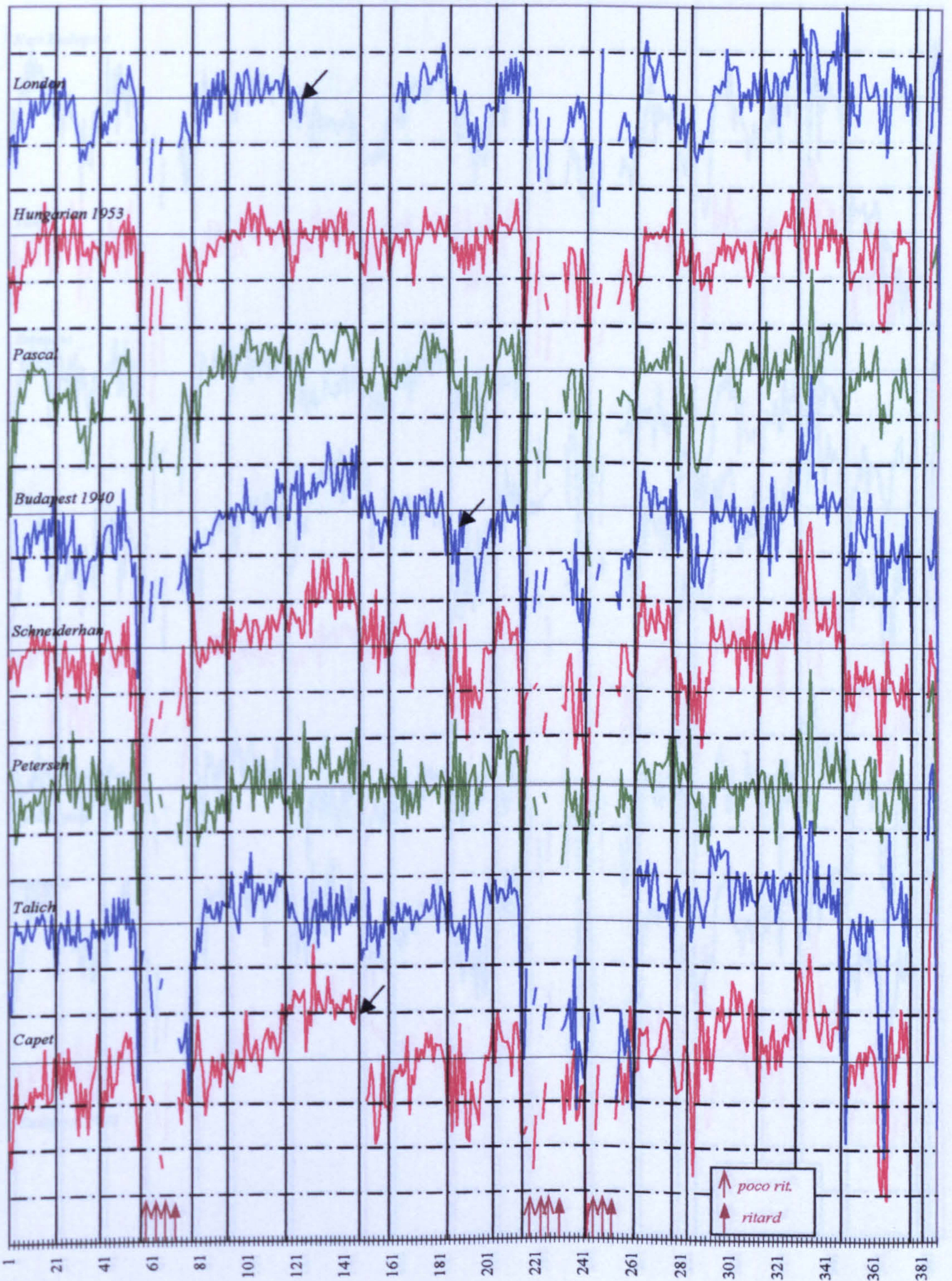


Fig. 4.3 (b) - Seventh movement tempo maps, local bar tempi plotted as percentage difference from modal tempo; bars with marked tempo change omitted. Side breaks in shellac 78 rpm recordings are indicated by a diagonal arrow and a break in the tempo graph line.

Op. 131, vii - Allegro

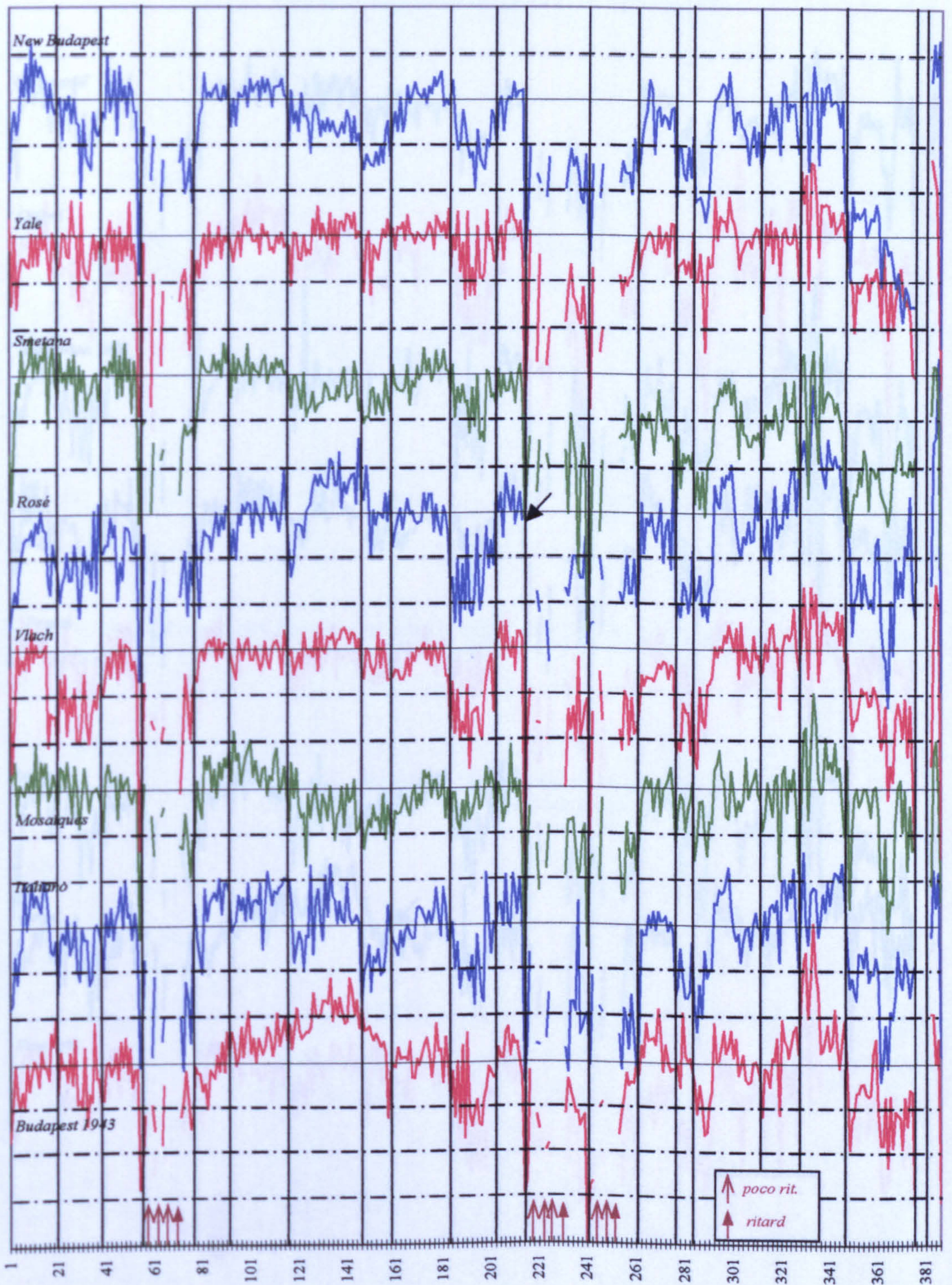


Fig. 4.3 (c) - Seventh movement tempo maps, local bar tempi plotted as percentage difference from modal tempo; bars with marked tempo change omitted. Side breaks in shellac 78 rpm recordings are indicated by a diagonal arrow and a break in the tempo graph line.

Op. 131, vii - Allegro

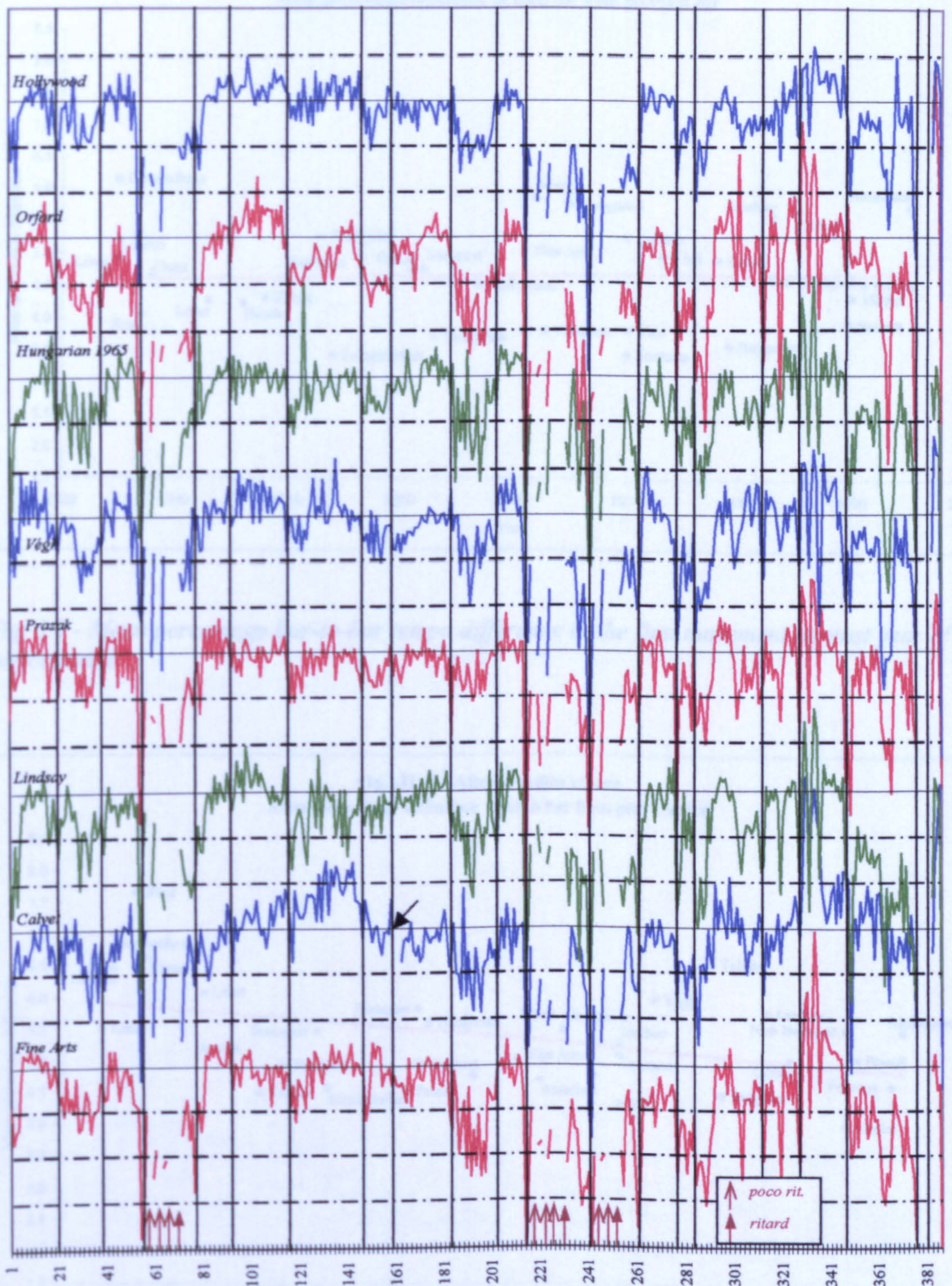


Fig. 4.3 (d) - Seventh movement tempo maps, local bar tempi plotted as percentage difference from modal tempo; bars with marked tempo change omitted. Side breaks in shellac 78 rpm recordings are indicated by a diagonal arrow and a break in the tempo graph line.

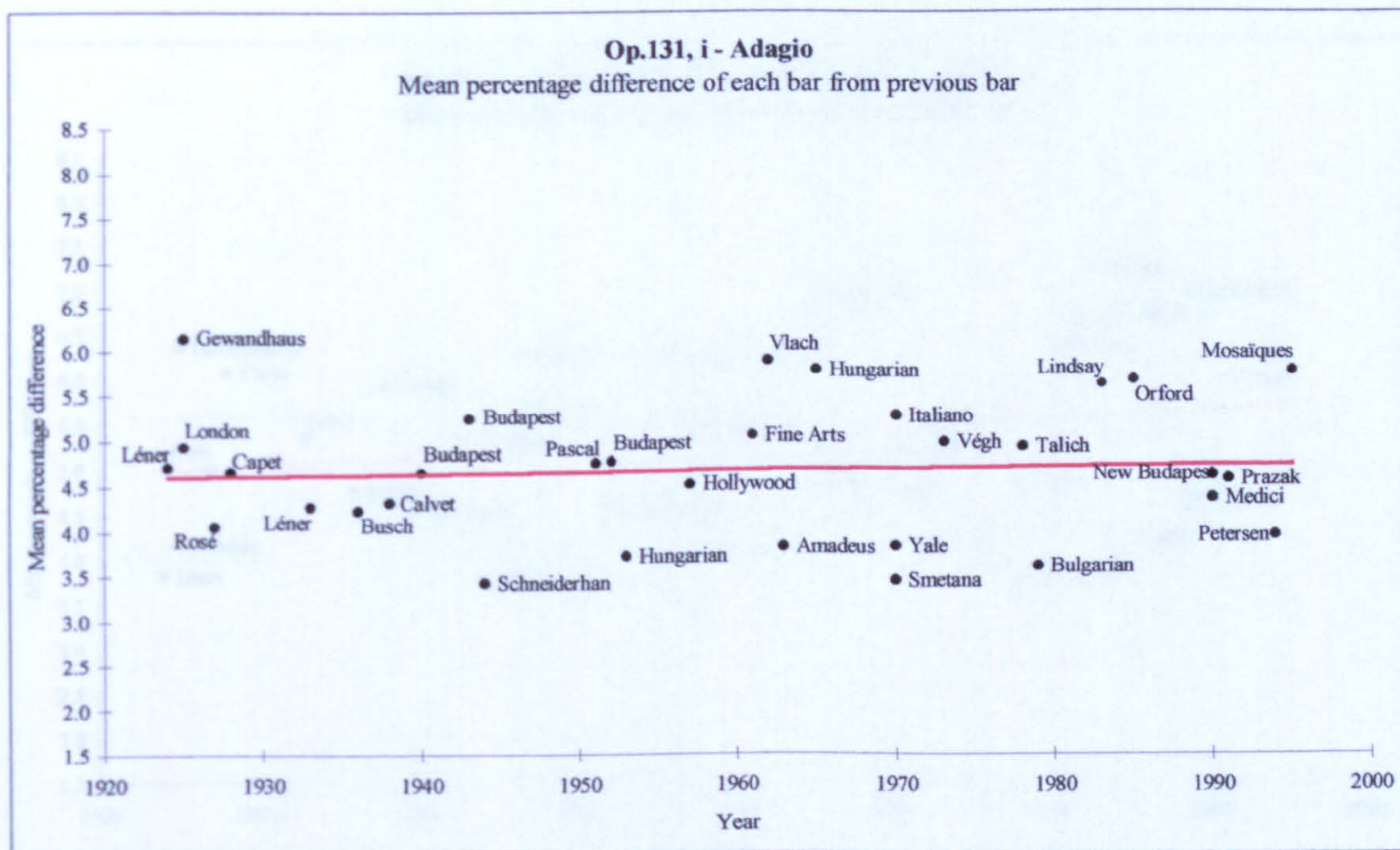


Fig. 5.1 - Mean percentage bar-to-bar tempo difference in the first movement against year of performance

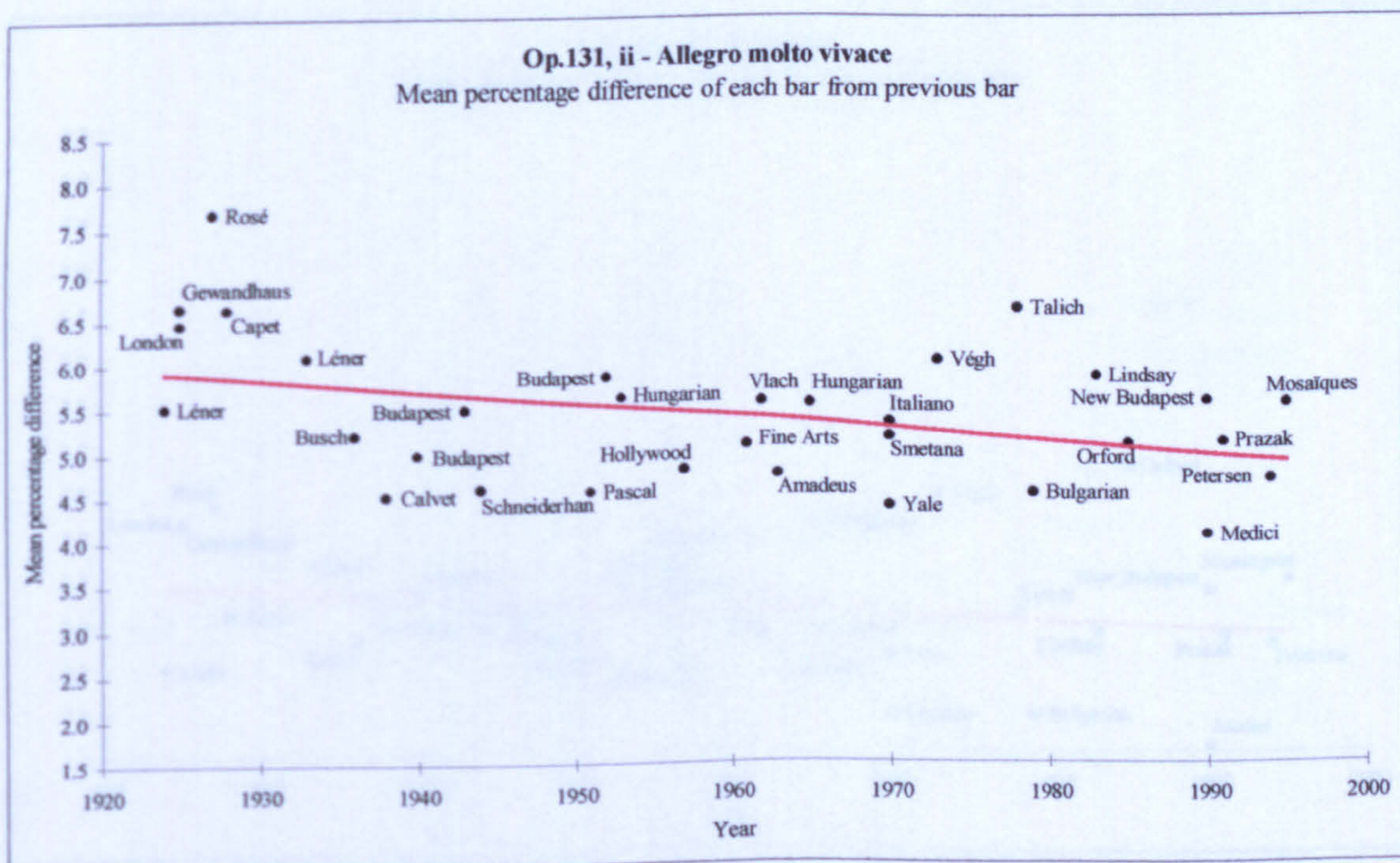


Fig. 5.2 - Mean percentage bar-to-bar tempo difference in the second movement against year of performance

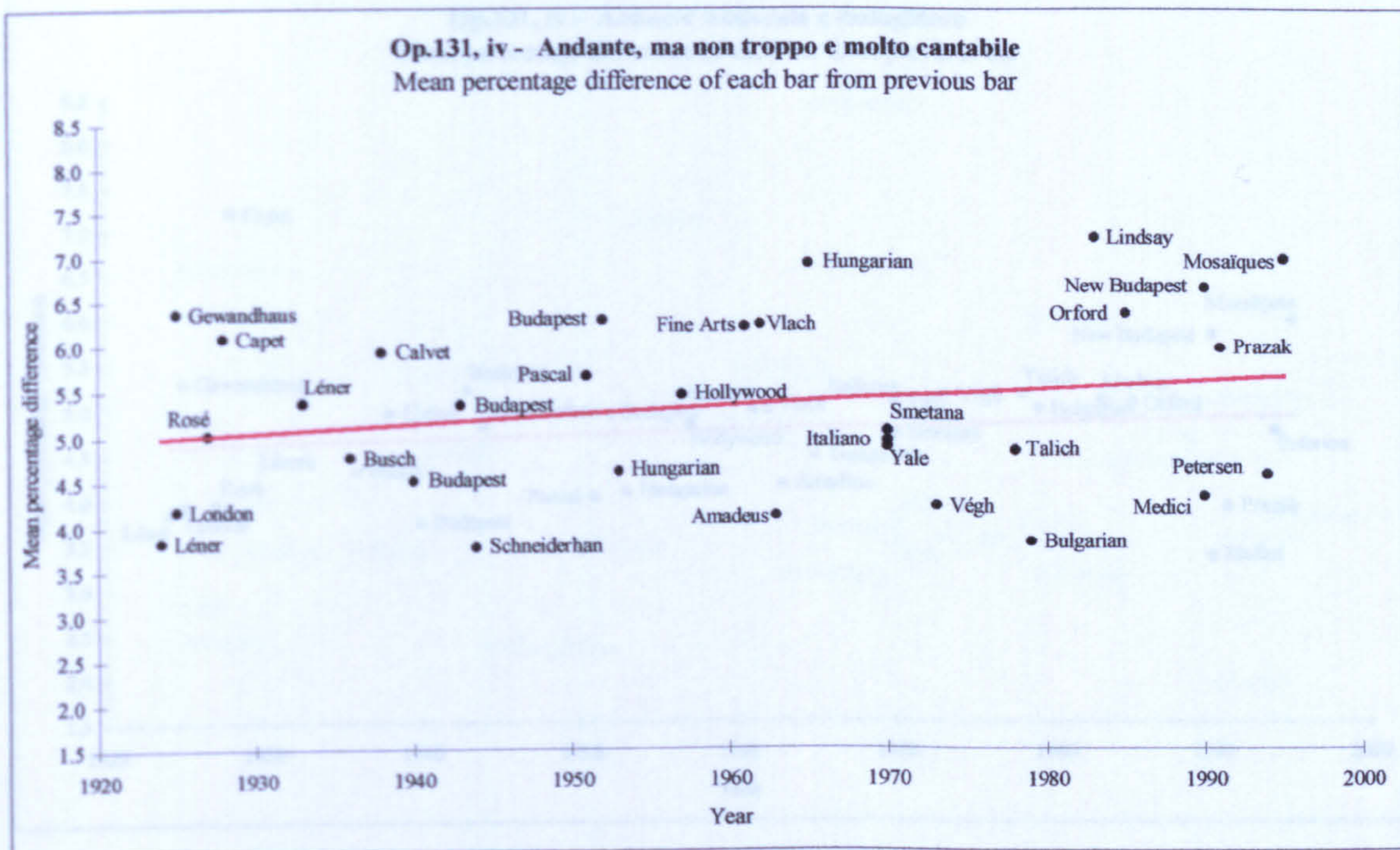


Fig. 5.3 - Mean percentage bar-to-bar tempo difference in the theme and first variation of the fourth movement against year of performance

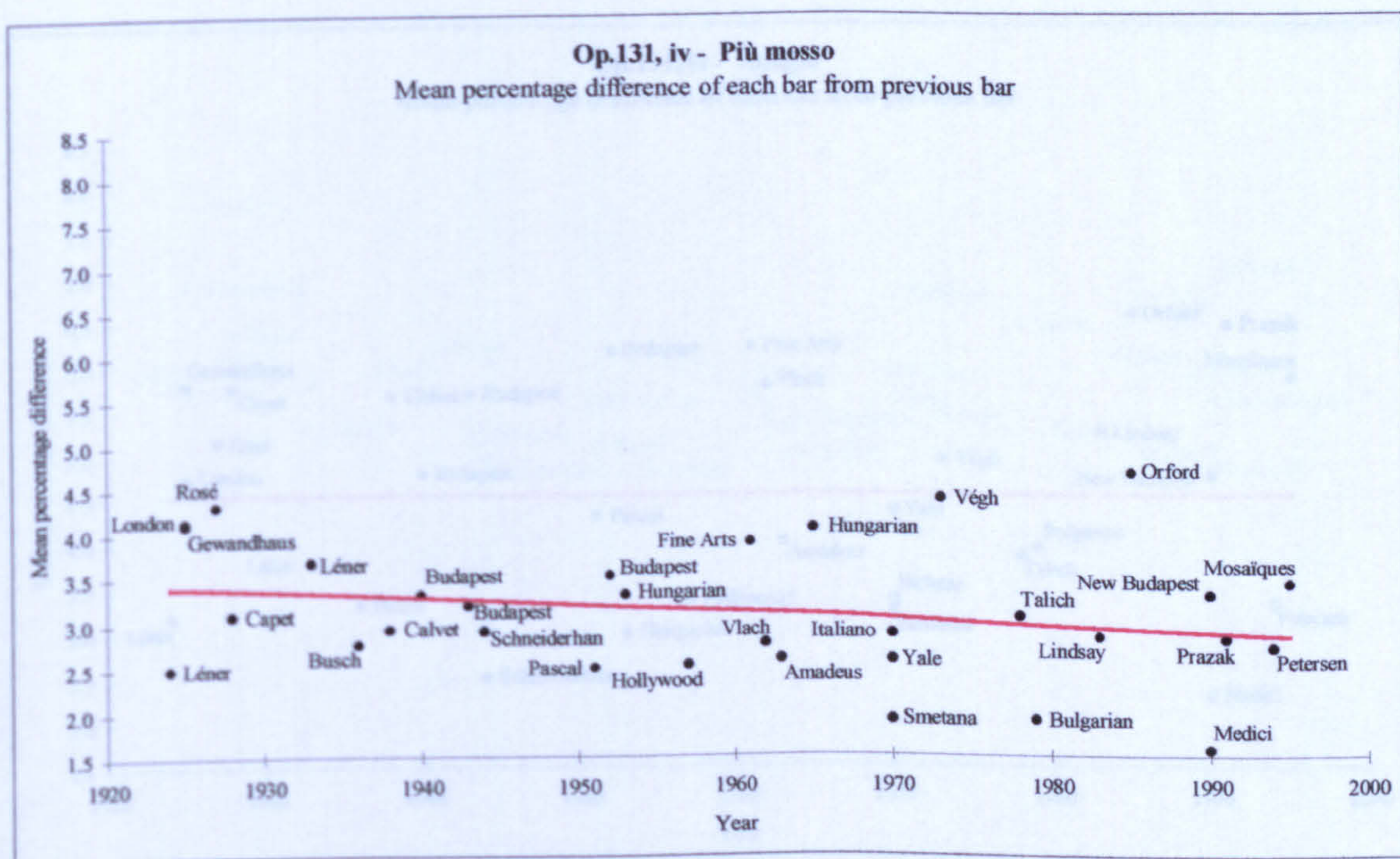


Fig. 5.4 - Mean percentage bar-to-bar tempo difference in the second variation of the fourth movement against year of performance

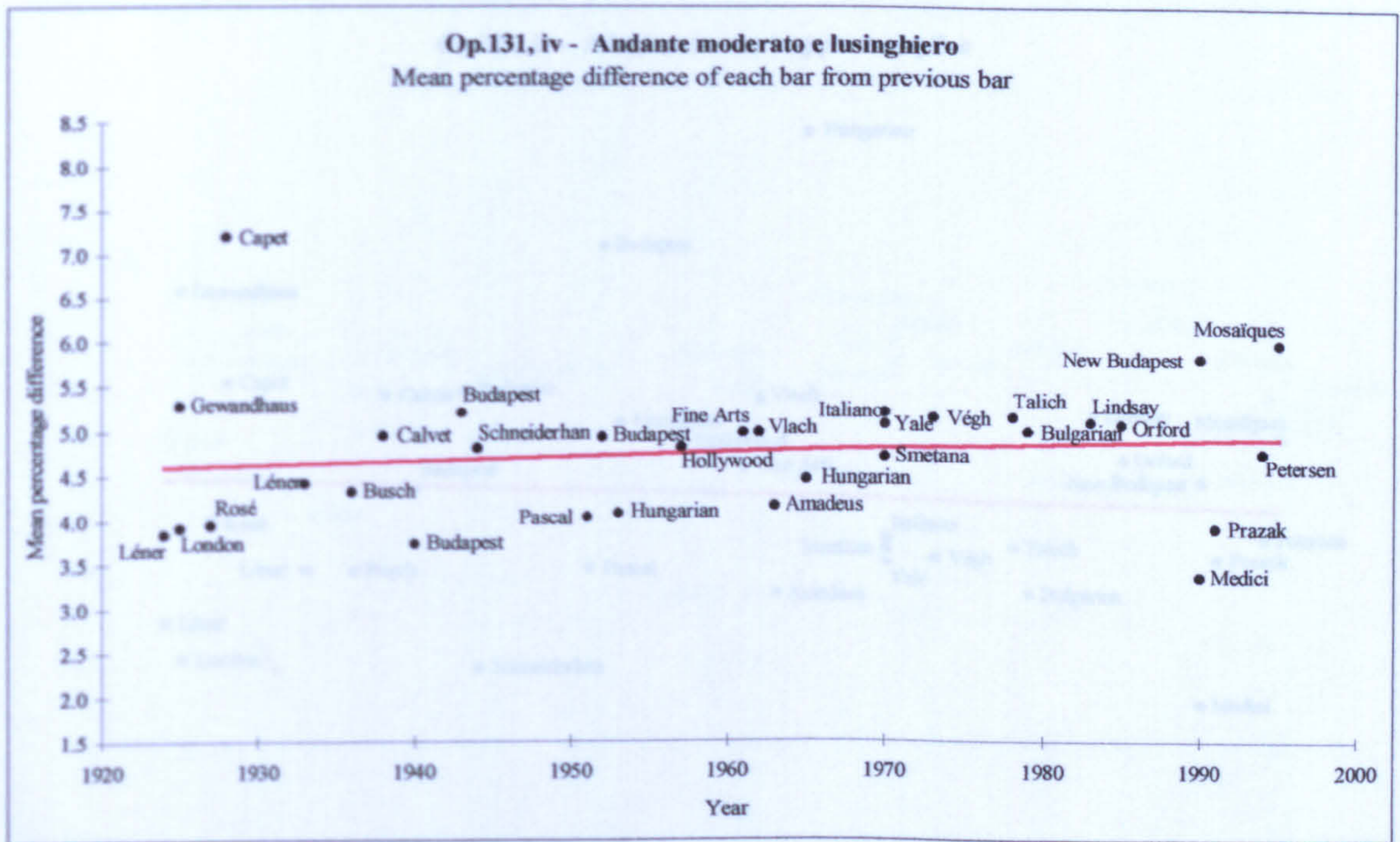


Fig. 5.5 - Mean percentage bar-to-bar tempo difference in the third variation of the fourth movement against year of performance

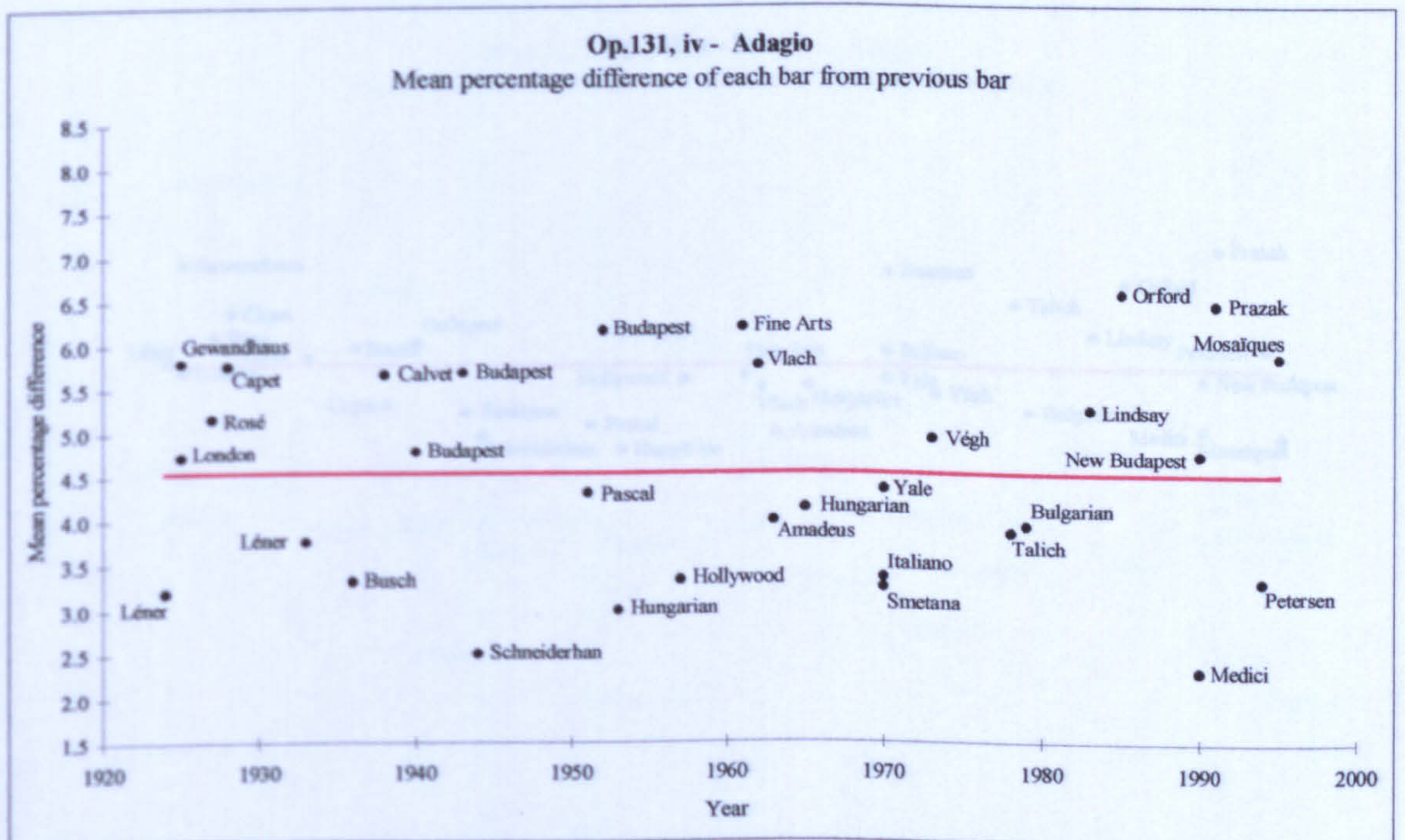


Fig. 5.6 - Mean percentage bar-to-bar tempo difference in the fourth variation of the fourth movement against year of performance

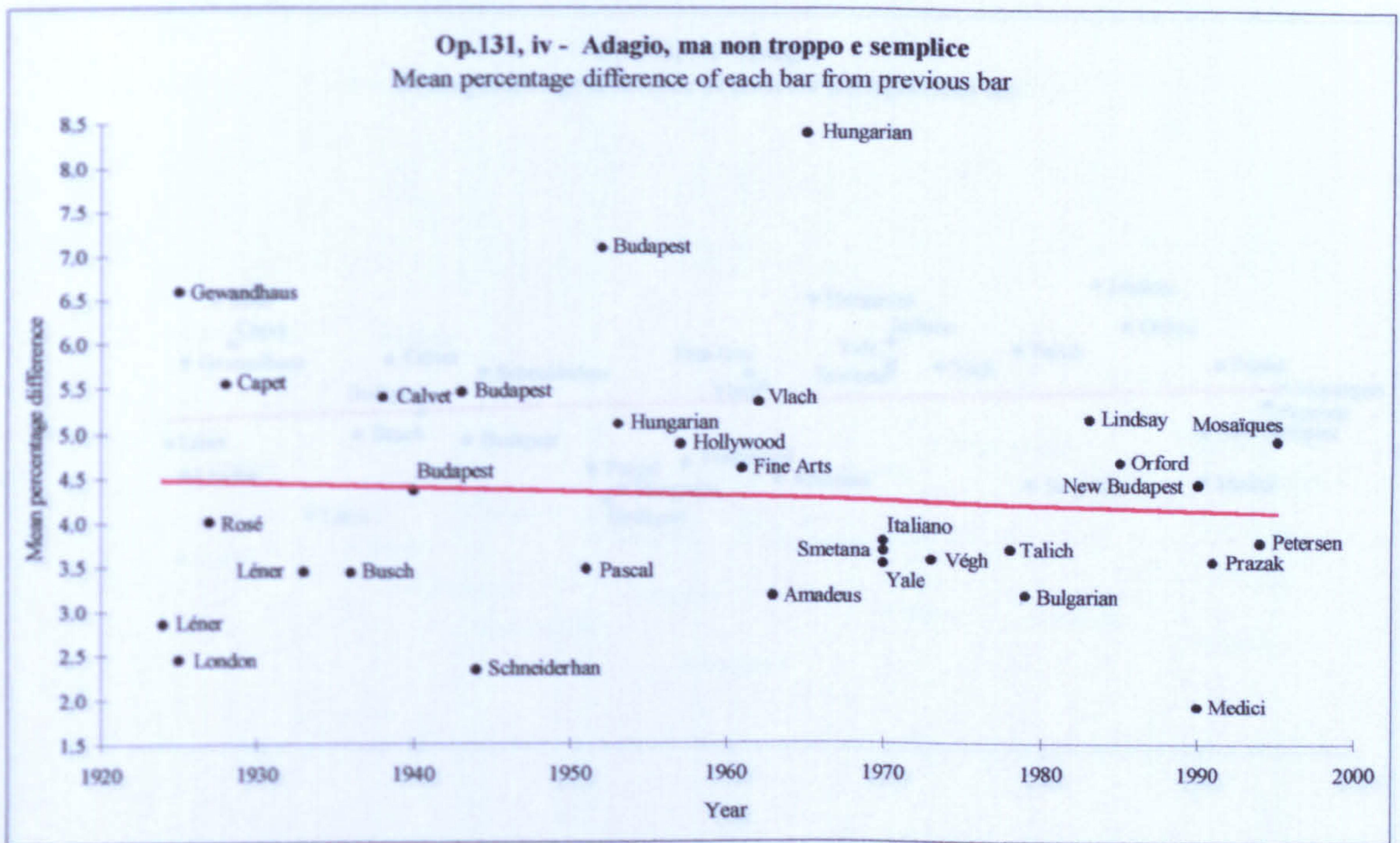


Fig. 5.7 - Mean percentage bar-to-bar tempo difference in the sixth variation of the fourth movement against year of performance

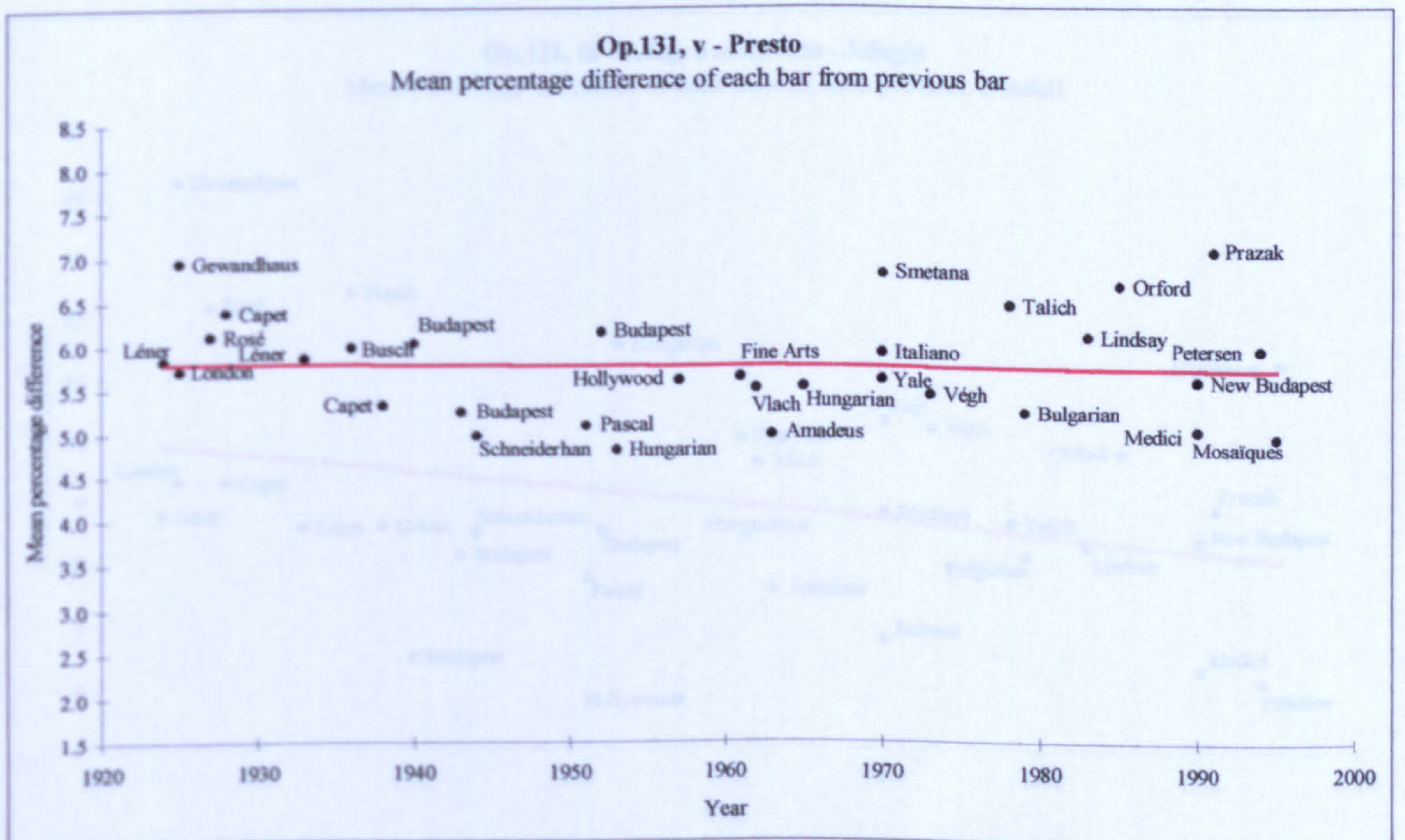


Fig. 5.8 - Mean percentage bar-to-bar tempo difference in the fifth movement against year of performance

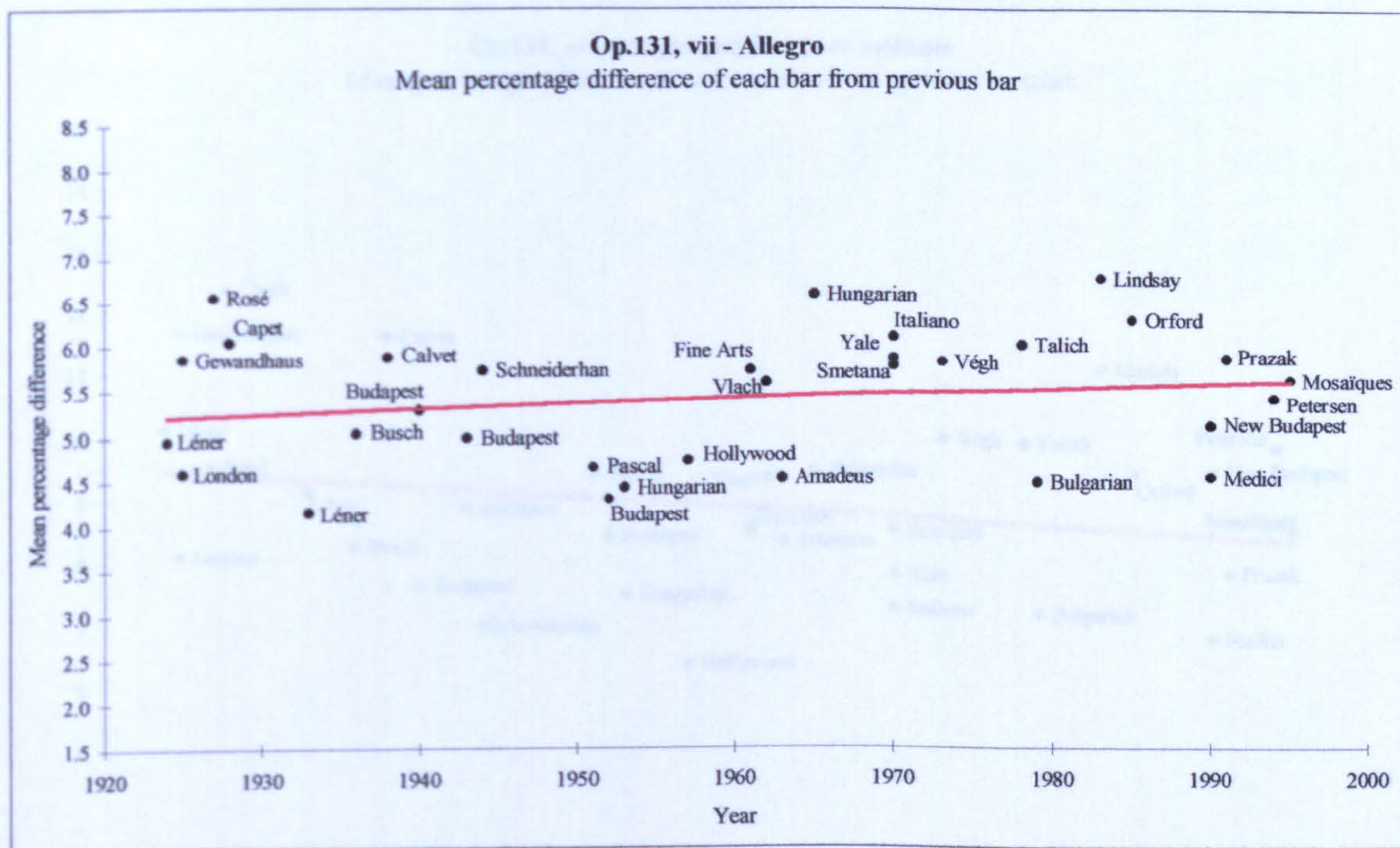


Fig. 5.9 - Mean percentage bar-to-bar tempo difference in the seventh movement against year of performance

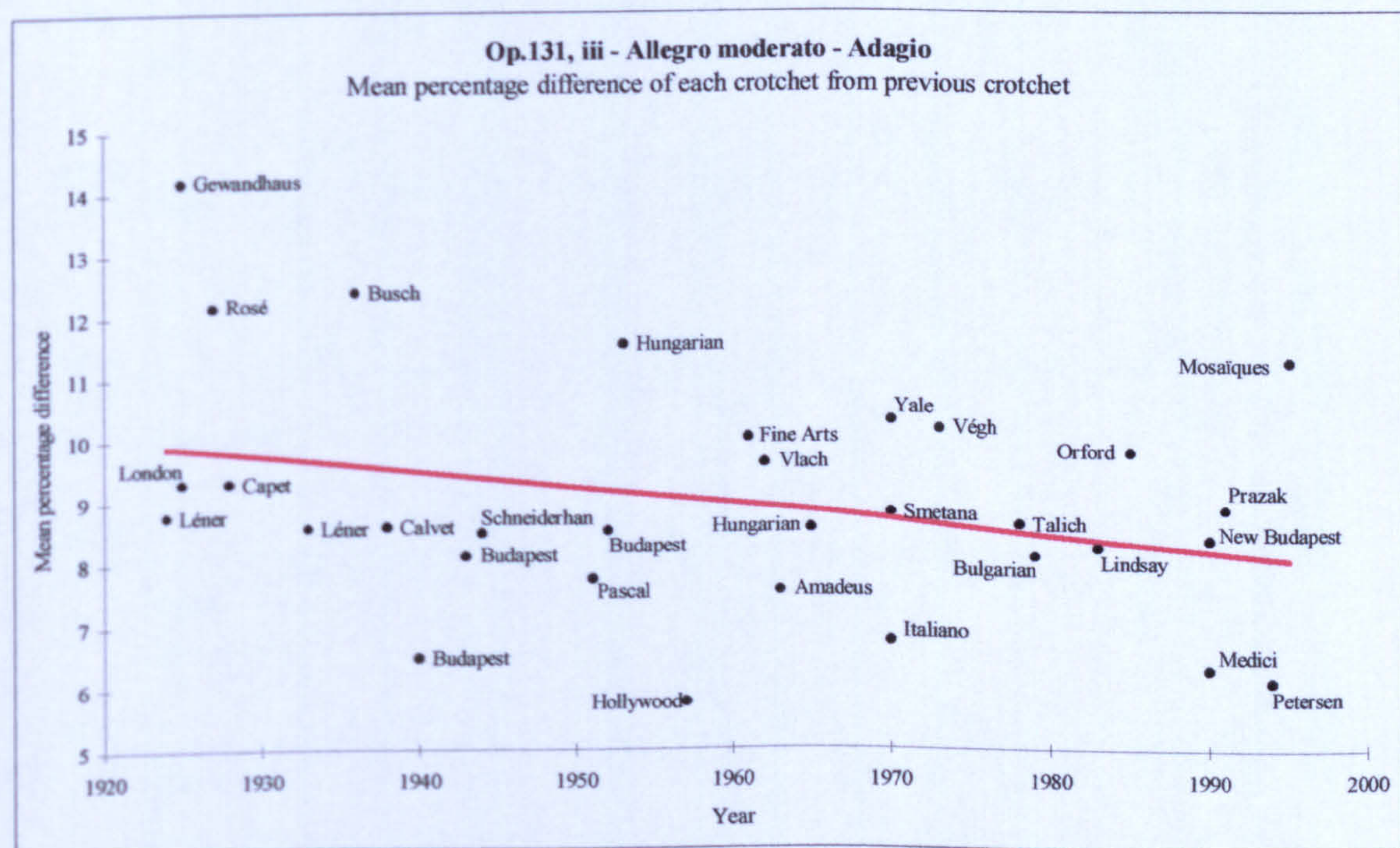


Fig. 5.10 - Mean percentage crotchet-to-crotchet tempo difference in the third movement against year of performance

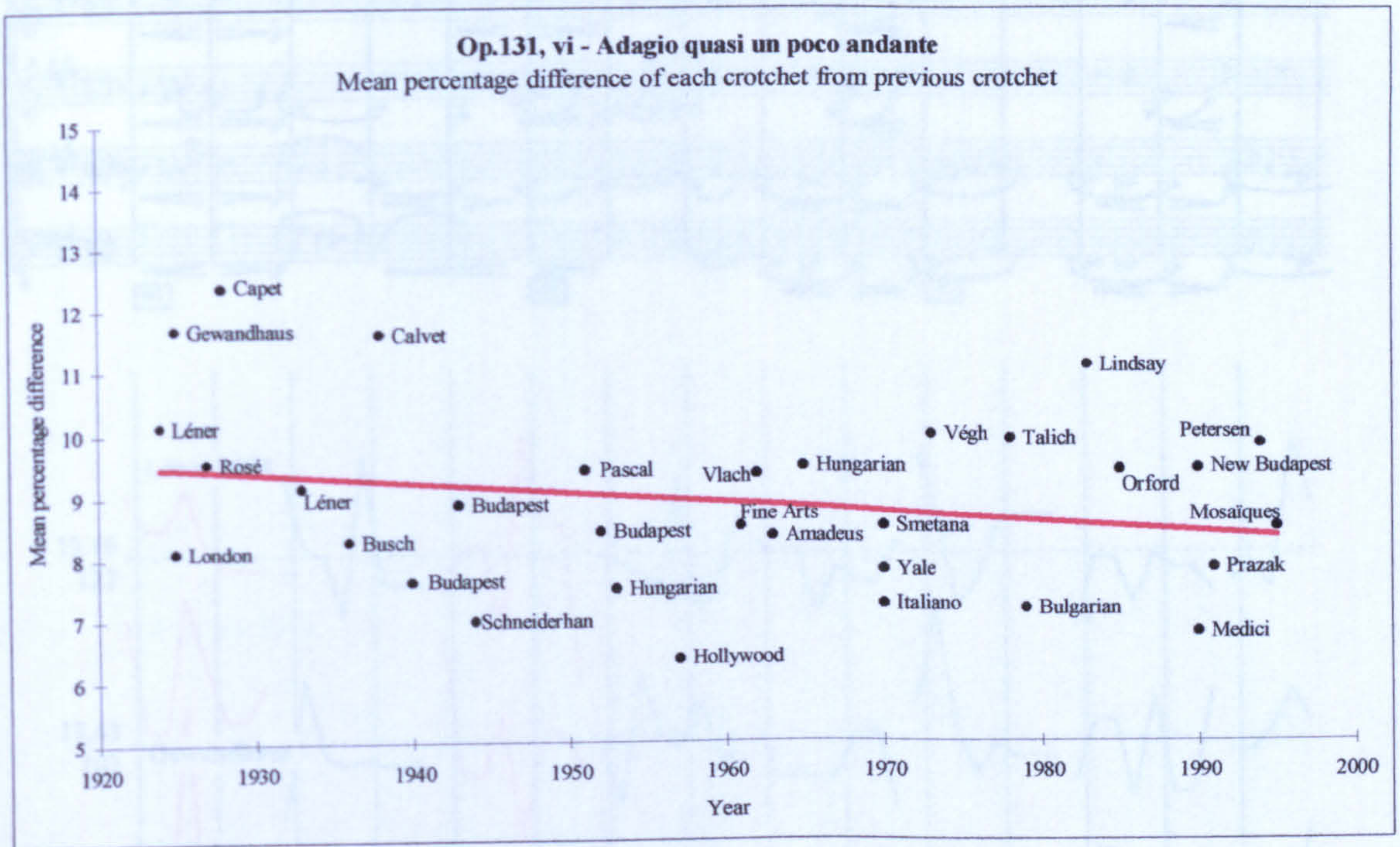


Fig. 5.11 - Mean percentage crotchet-to-crotchet tempo difference in the sixth movement against year of performance

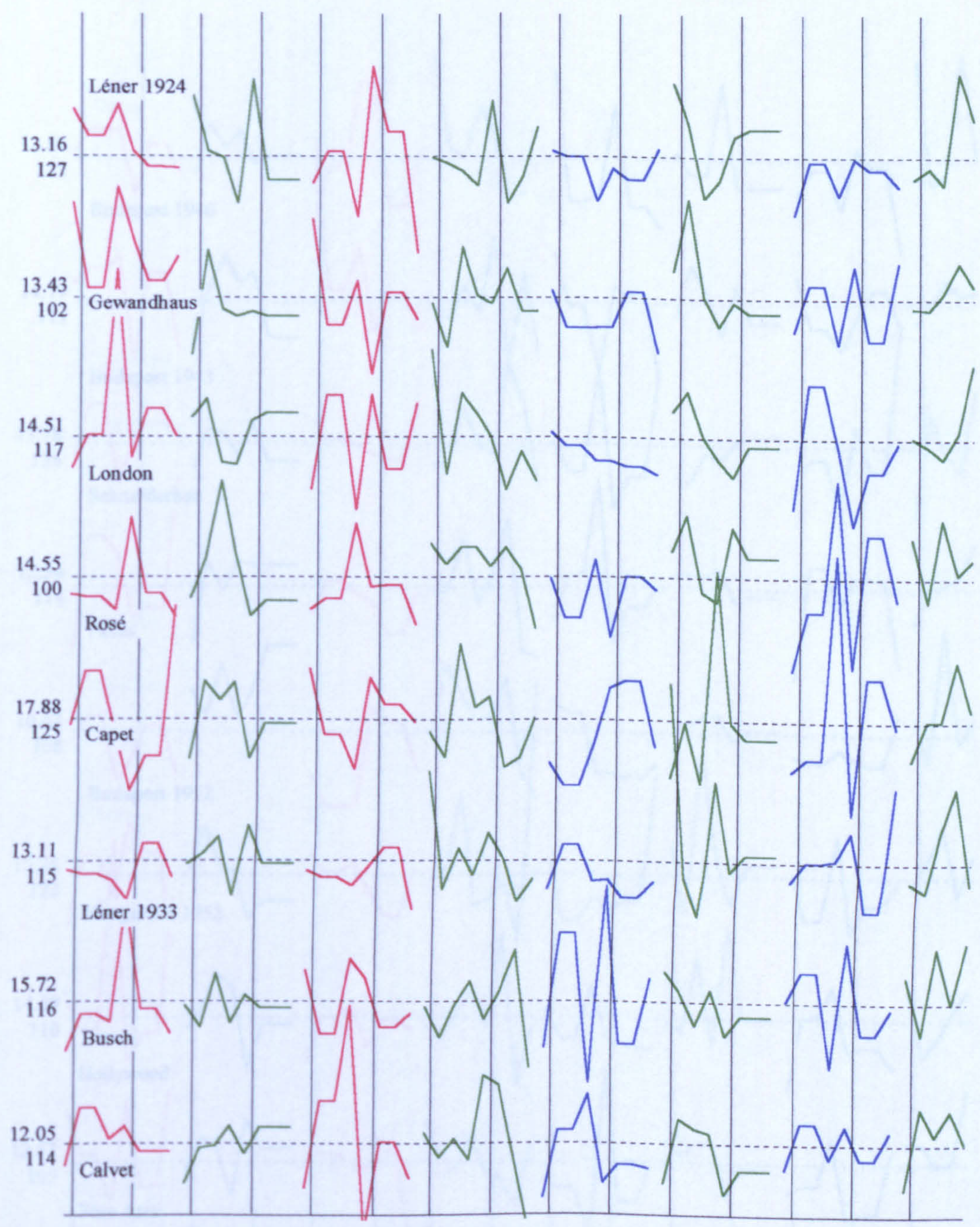


Fig. 5.12 (a) - Seventh movement, bars 184-199. Tempo adjusted to mean = 100, with gridlines 50% apart. Figures given are the average percentage difference of one crotchet from the previous, and the mean tempo for this section.

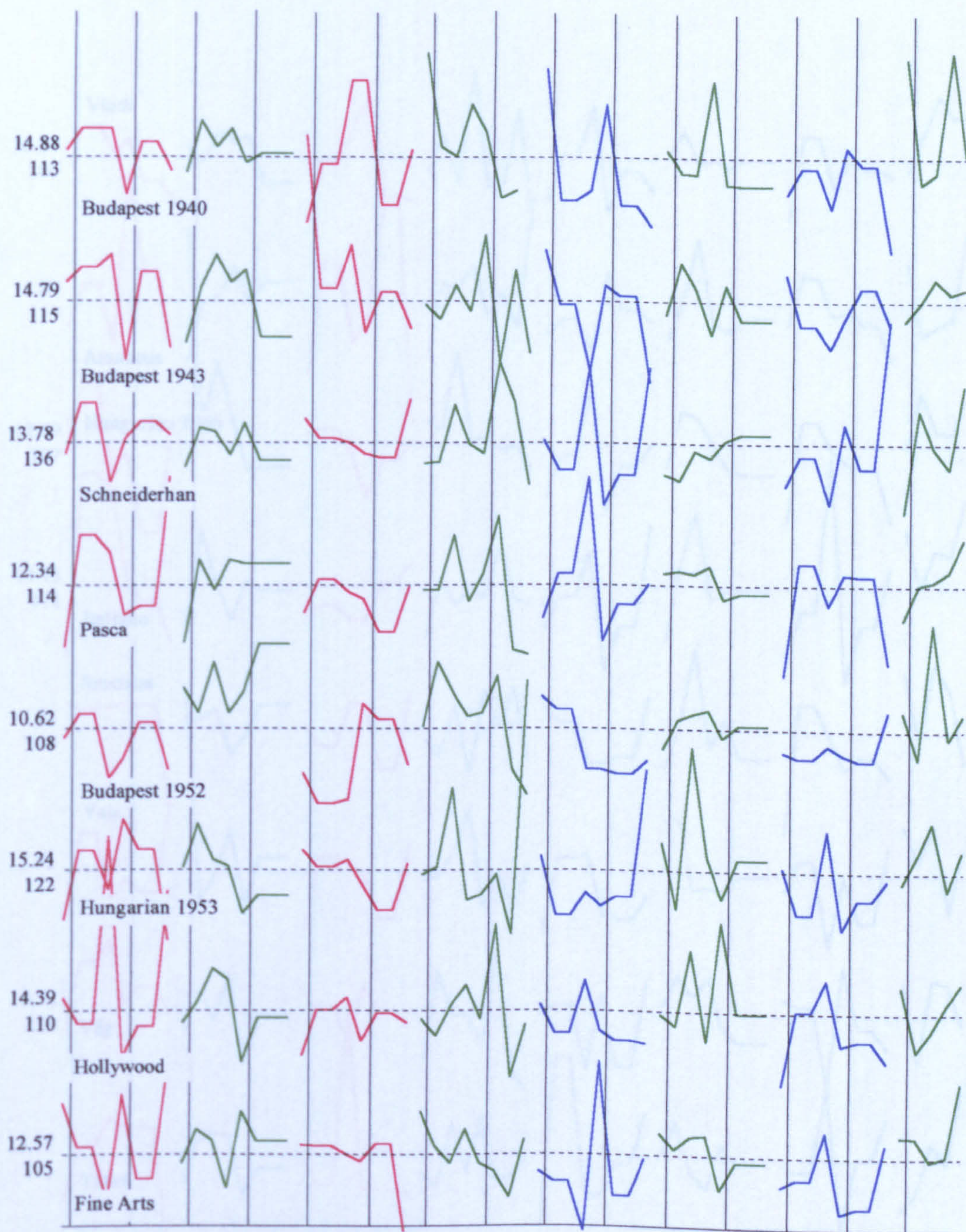


Fig. 5.12 (b) - Seventh movement, bars 184-199. Tempo adjusted to mean = 100, with gridlines 50% apart. Figures given are the average percentage difference of one crotchet from the previous, and the mean tempo for this section.

(Allegro)



Fig. 5.12 (c) - Seventh movement, bars 184-199. Tempo adjusted to mean = 100, with gridlines 50% apart. Figures given are the average percentage difference of one crotchet from the previous, and the mean tempo for this section.

(Allegro)

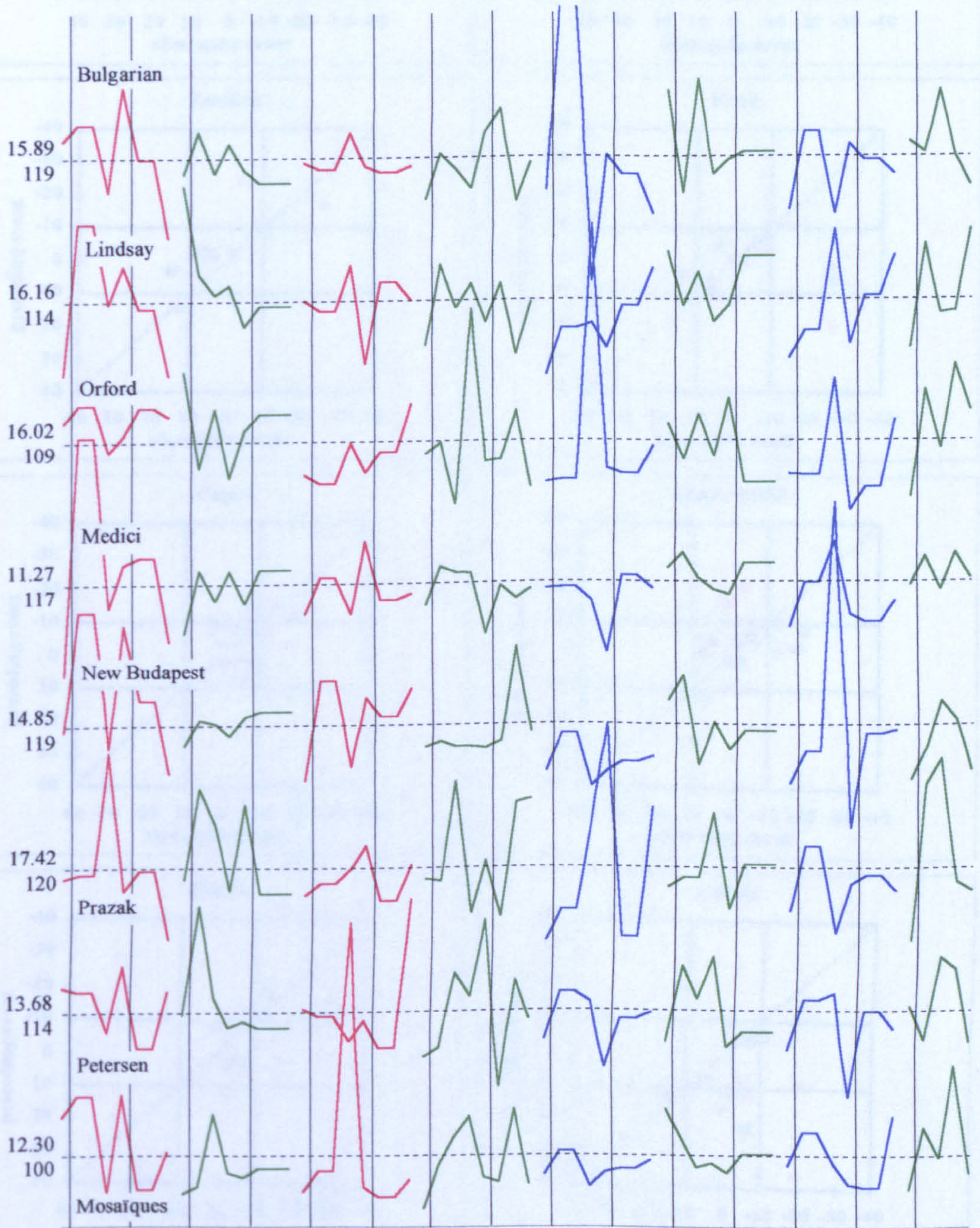


Fig. 5.12 (d) - Seventh movement, bars 184-199. Tempo adjusted to mean = 100, with gridlines 50% apart. Figures given are the average percentage difference of one crotchet from the previous, and the mean tempo for this section.

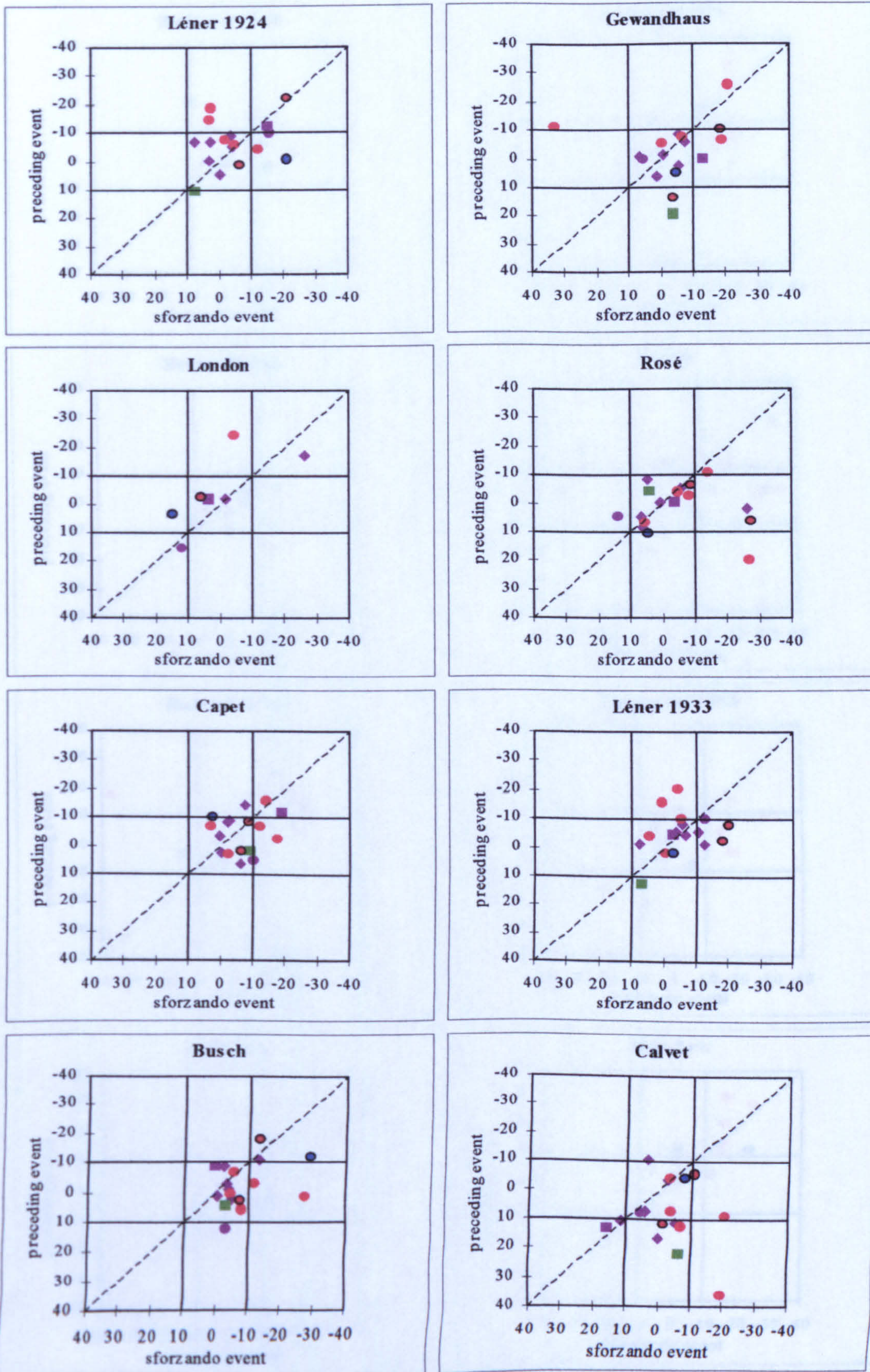


Fig. 5.13 (a) - First movement - sforzando events, plotted by percentage tempo change on sforzando event and the preceding event. For key, see text in Volume 1, p.140

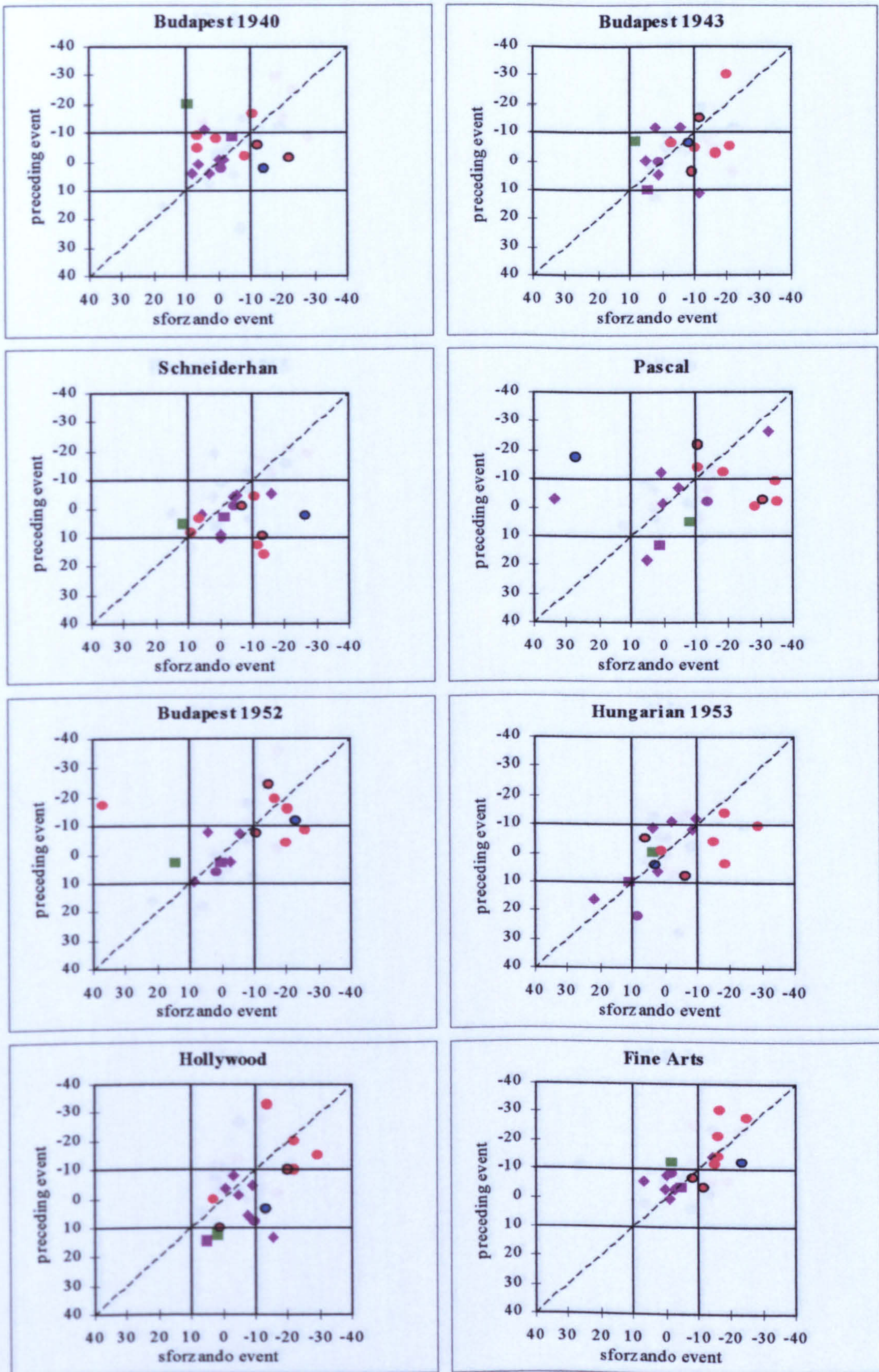


Fig. 5.13 (b) - First movement - sforzando events, plotted by percentage tempo change on sforzando event and the preceding event. For key, see text in Volume 1, p.140

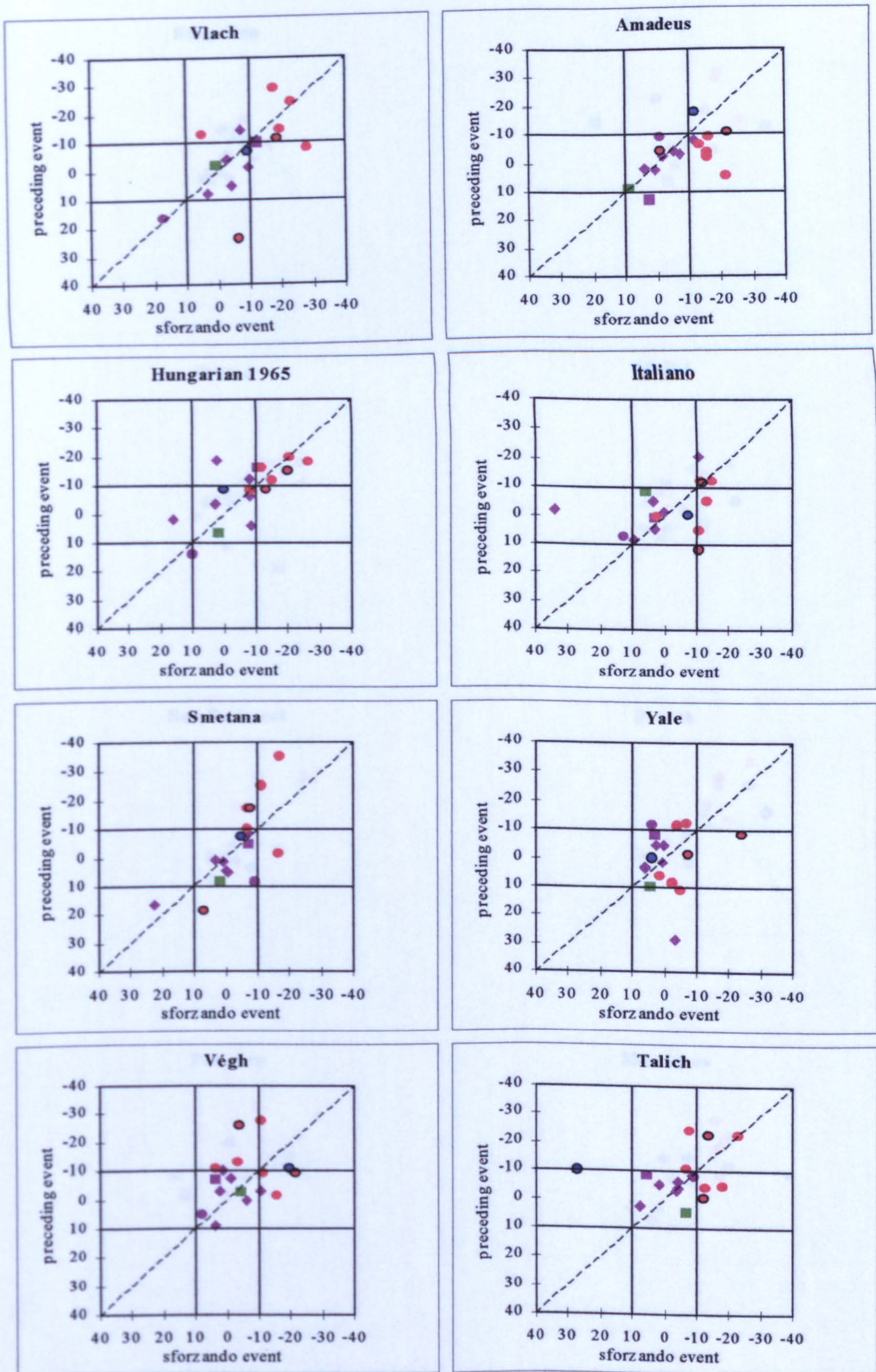


Fig. 5.13 (c) - First movement - sforzando events, plotted by percentage tempo change on sforzando event and the preceding event. For key, see text in Volume 1, p.140

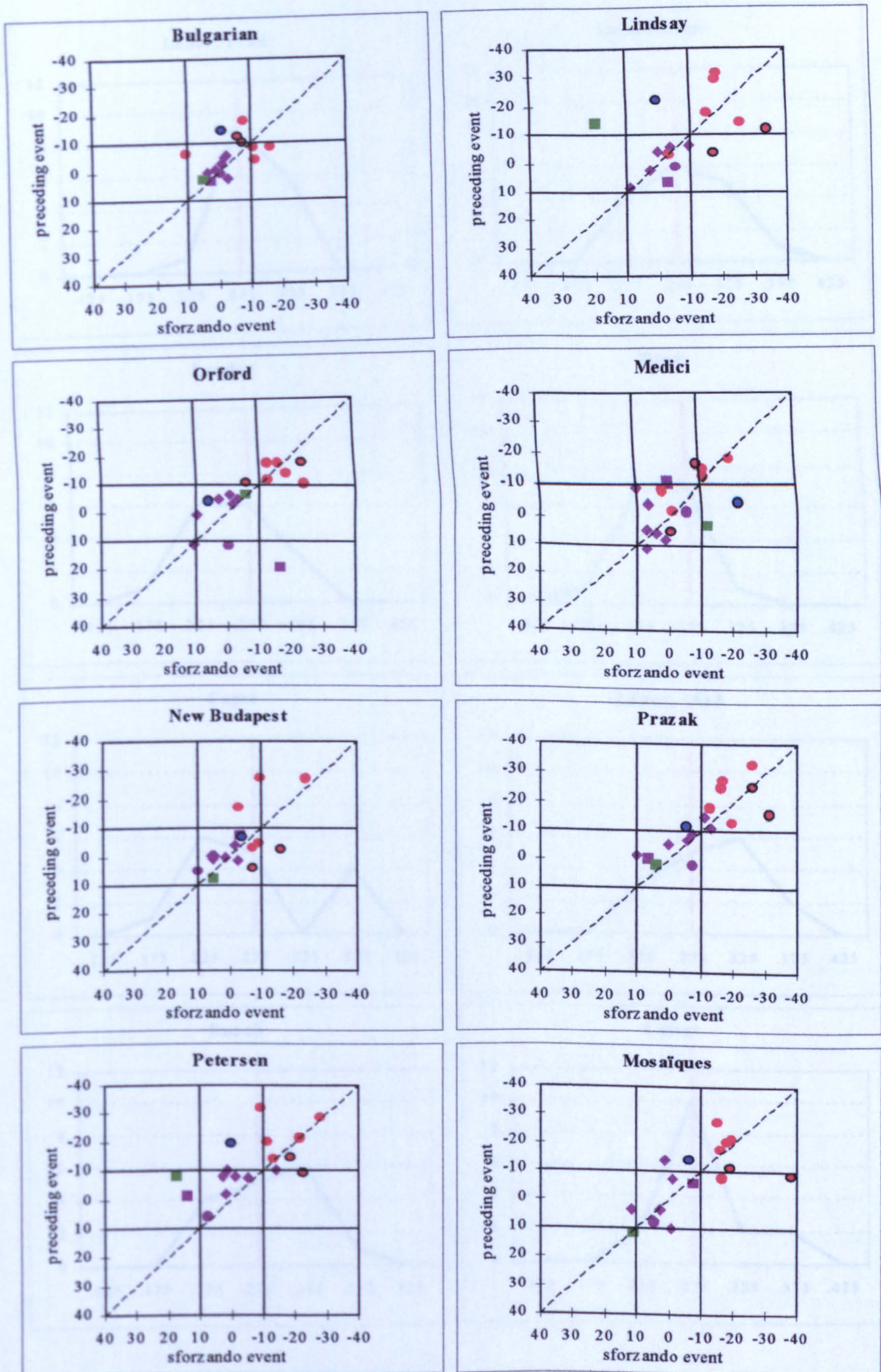


Fig. 5.13 (d) - First movement - sforzando events, plotted by percentage tempo change on sforzando event and the preceding event. For key, see text in Volume 1, p.140

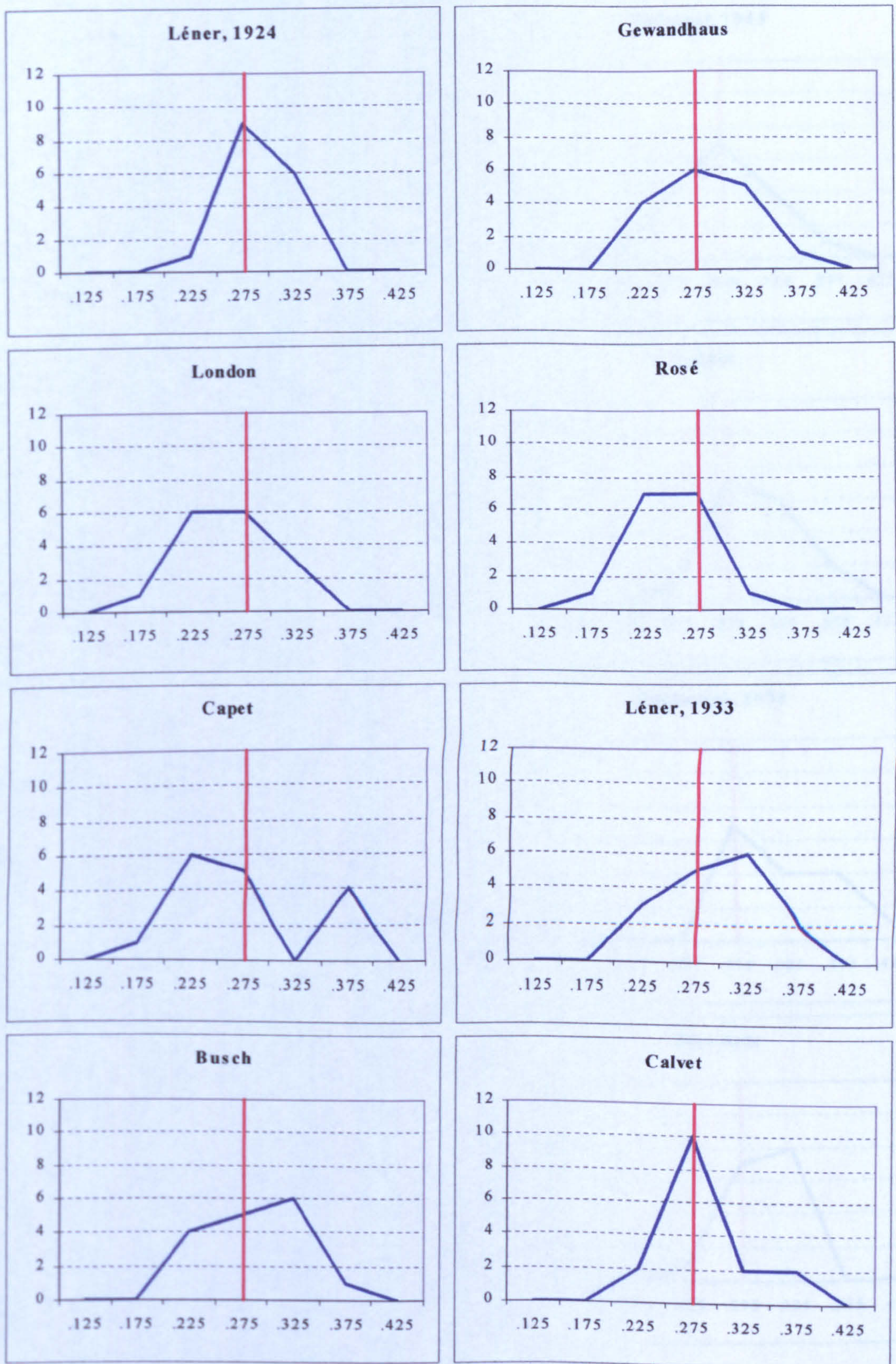


Fig. 5.14 (a) - Sixth movement – dotted rhythms, frequency of proportion of semiquaver to full crotchet duration, plotted in bins of 5%

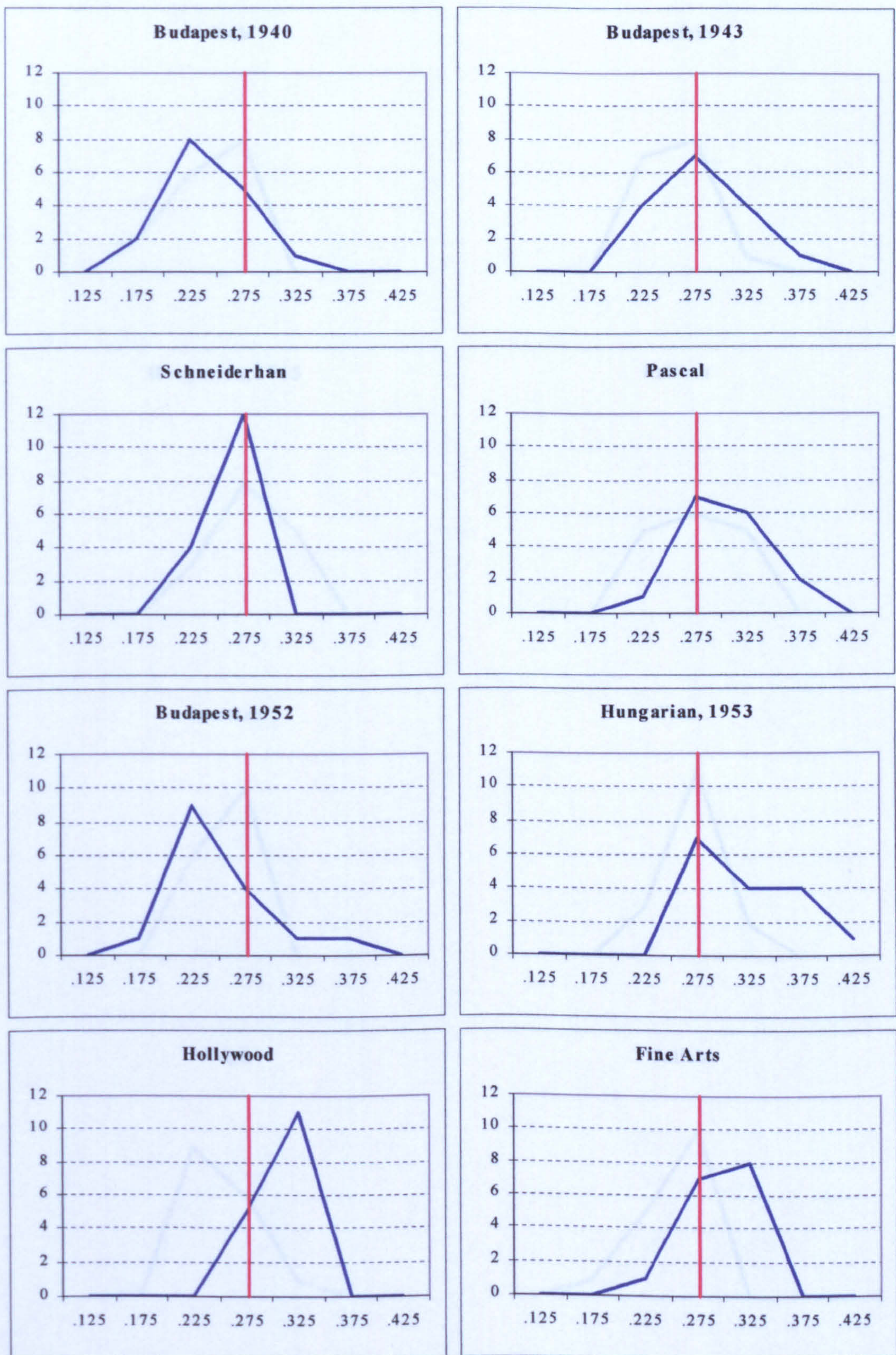


Fig. 5.14 (b) - Sixth movement – dotted rhythms, frequency of proportion of semiquaver to full crotchet duration, plotted in bins of 5%

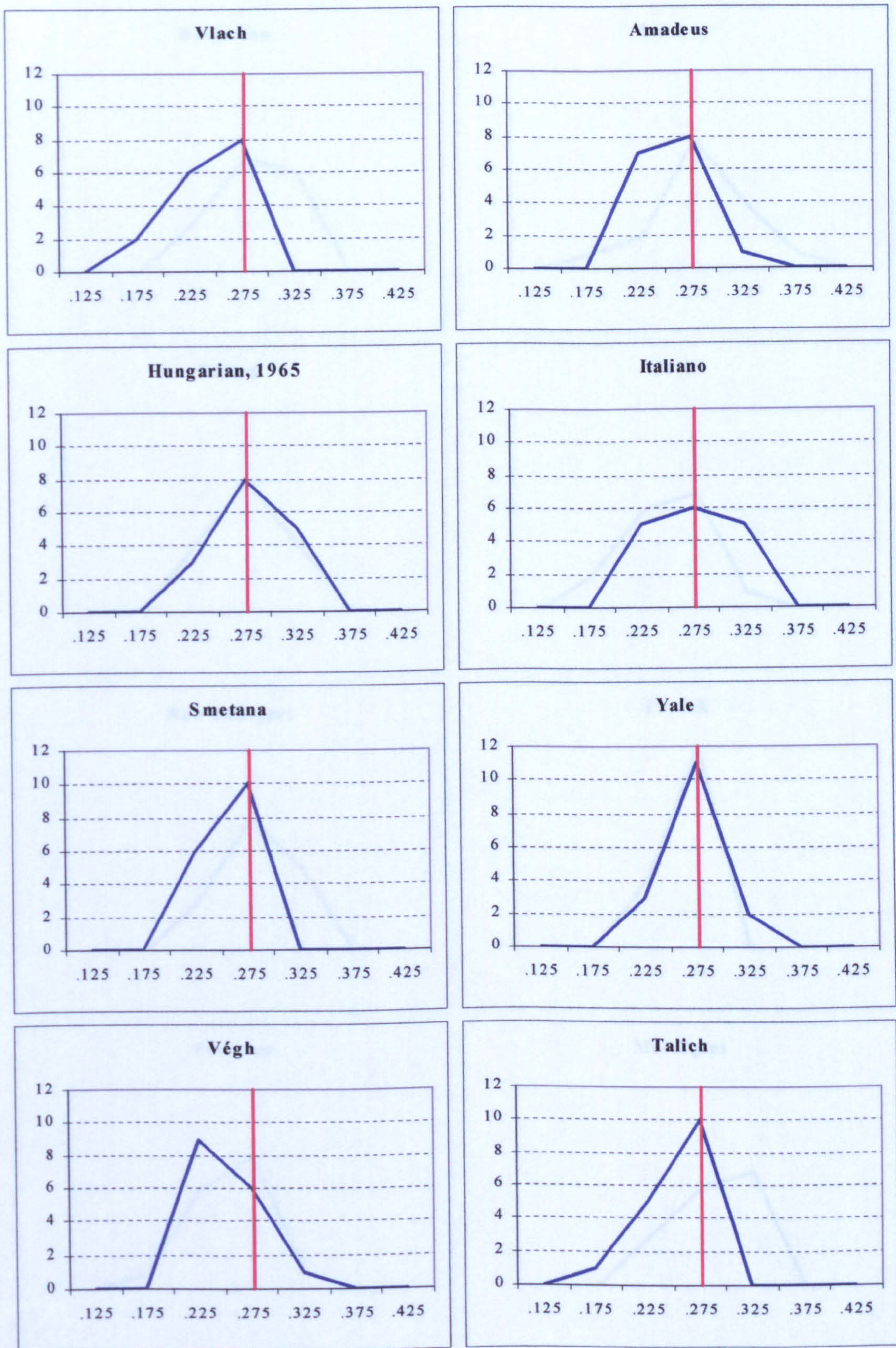


Fig. 5.14 (c) - Sixth movement – dotted rhythms, frequency of proportion of semiquaver to full crotchet duration, plotted in bins of 5%

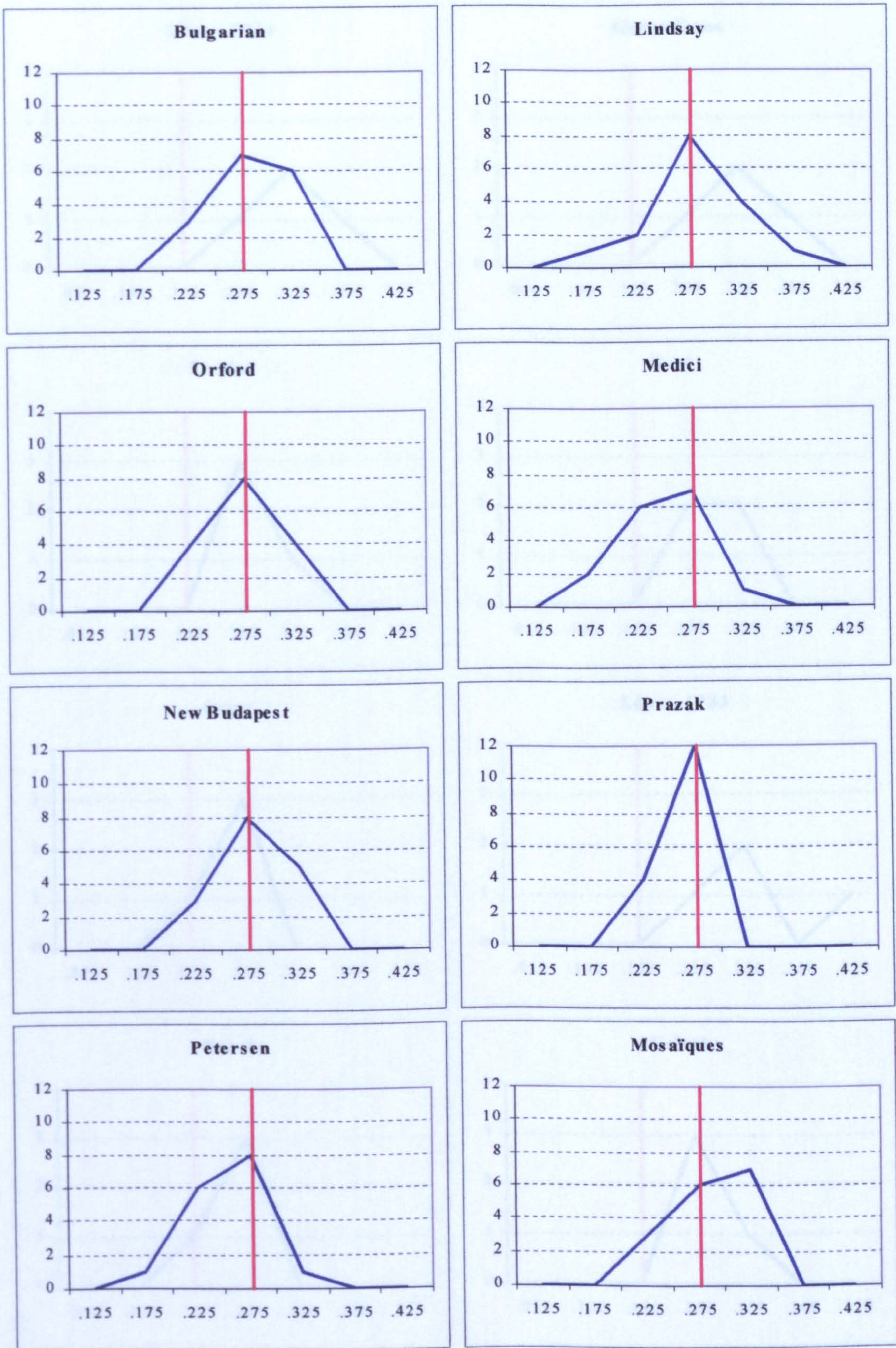


Fig. 5.14 (d) - Sixth movement – dotted rhythms, frequency of proportion of semiquaver to full crotchet duration, plotted in bins of 5%

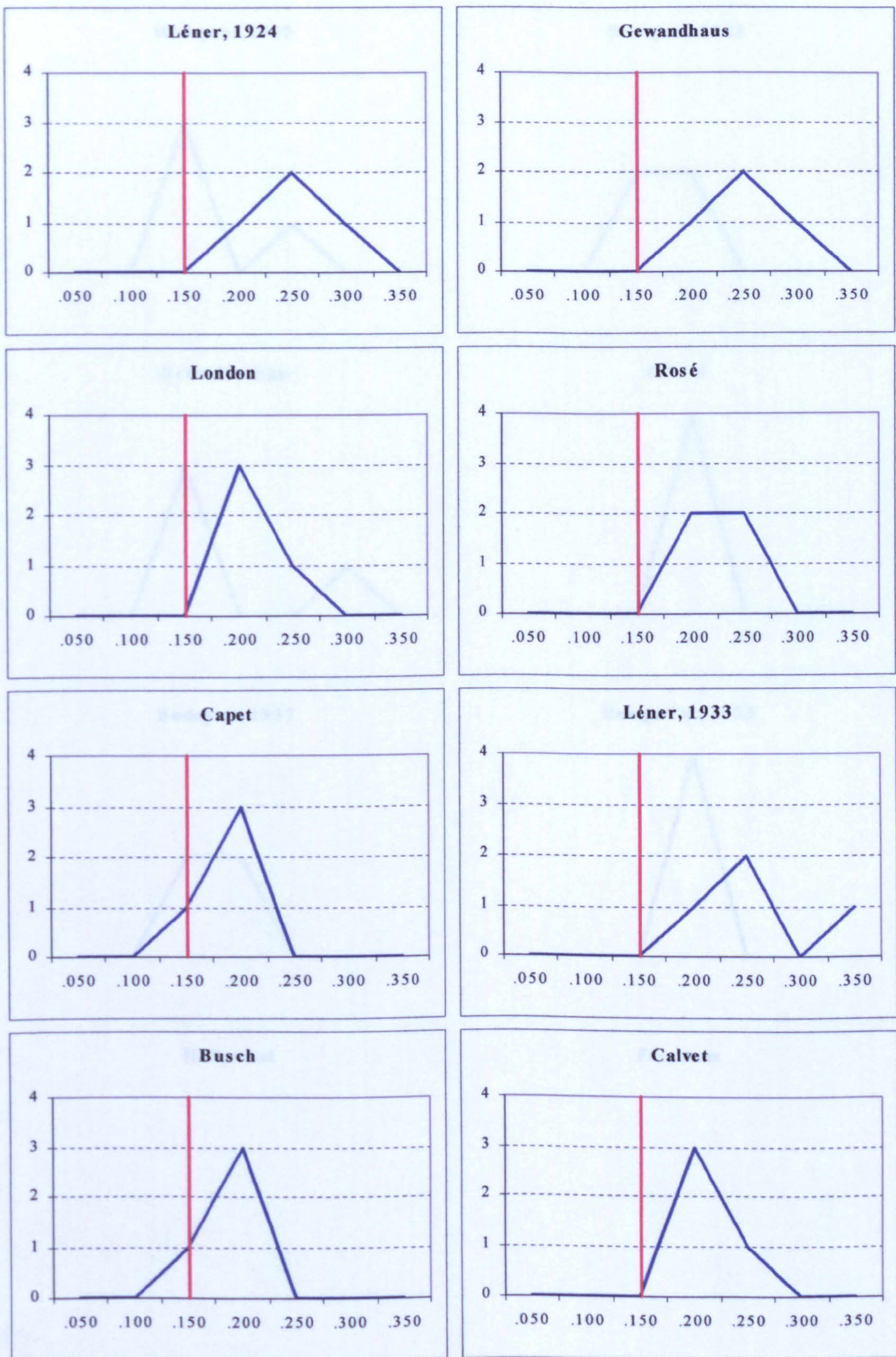


Fig. 5.15 (a) - Sixth movement – double-dotted rhythms, frequency of proportion of semiquaver to full crotchet duration, plotted in bins of 5%

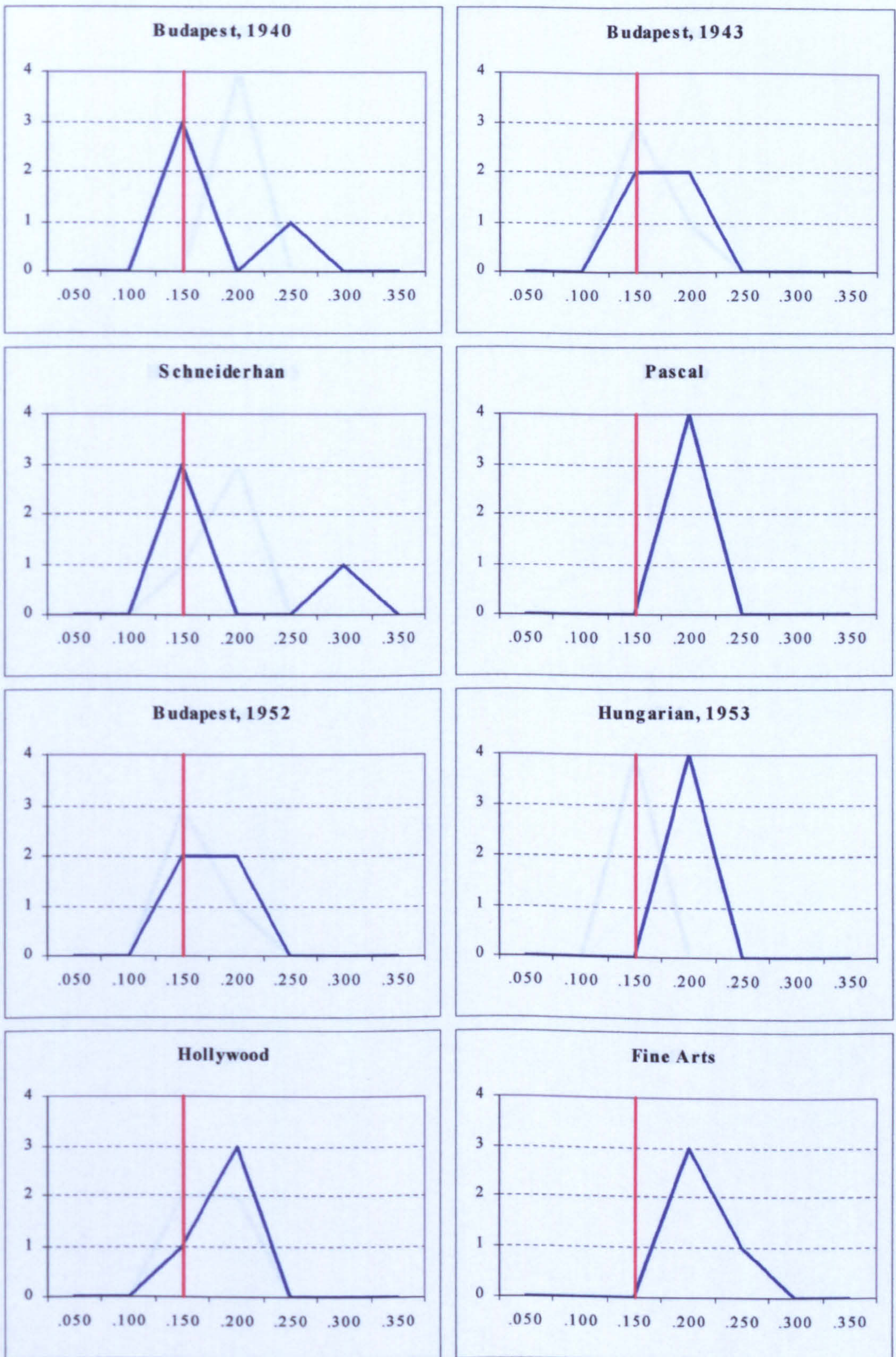


Fig. 5.15 (b) - Sixth movement – double-dotted rhythms, frequency of proportion of semiquaver to full crotchet duration, plotted in bins of 5%

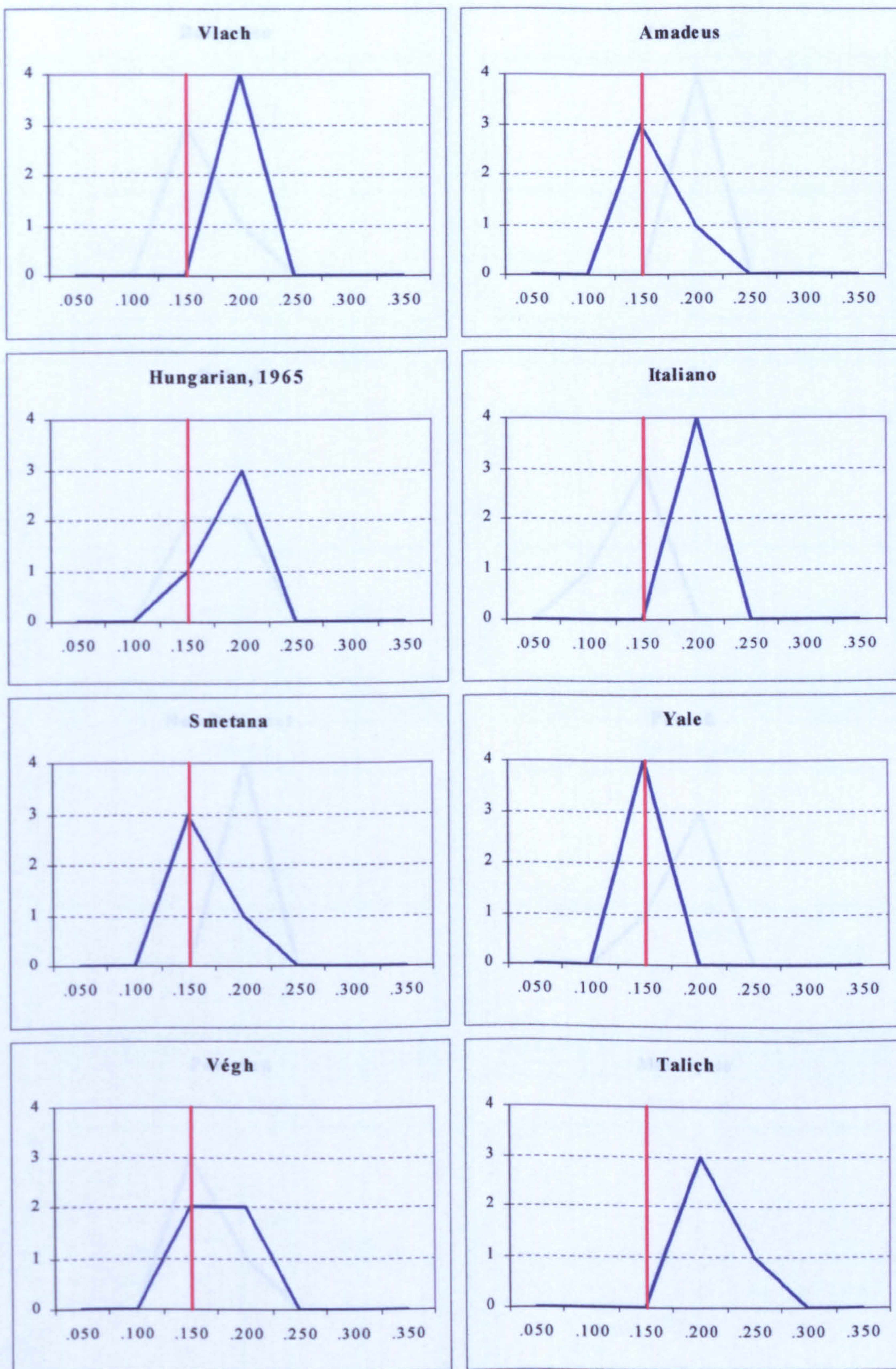


Fig. 5.15 (c) - Sixth movement – double-dotted rhythms, frequency of proportion of semiquaver to full crotchet duration, plotted in bins of 5%

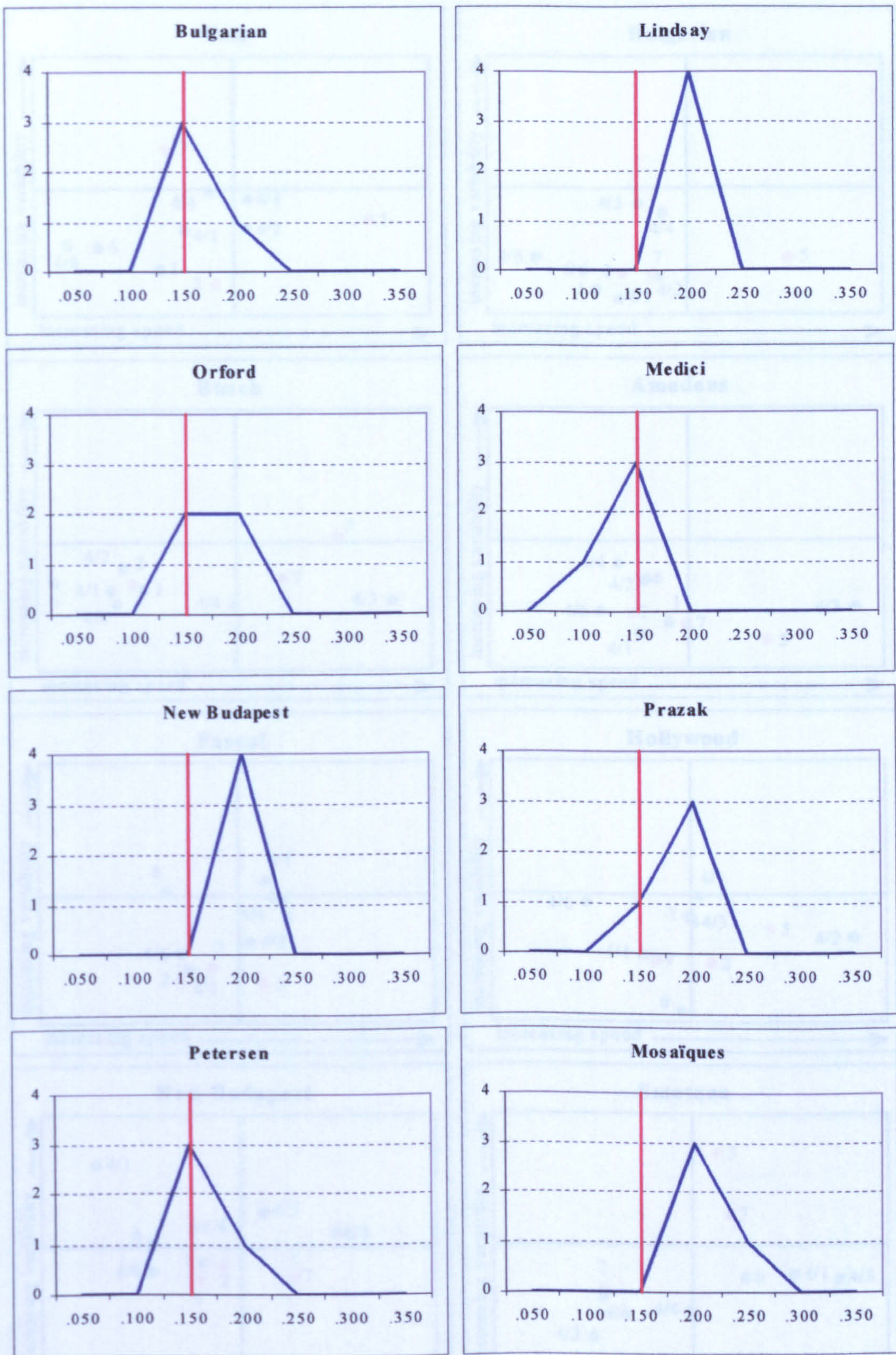


Fig. 5.15 (d) - Sixth movement – double-dotted rhythms, frequency of proportion of semiquaver to full crotchet duration, plotted in bins of 5%

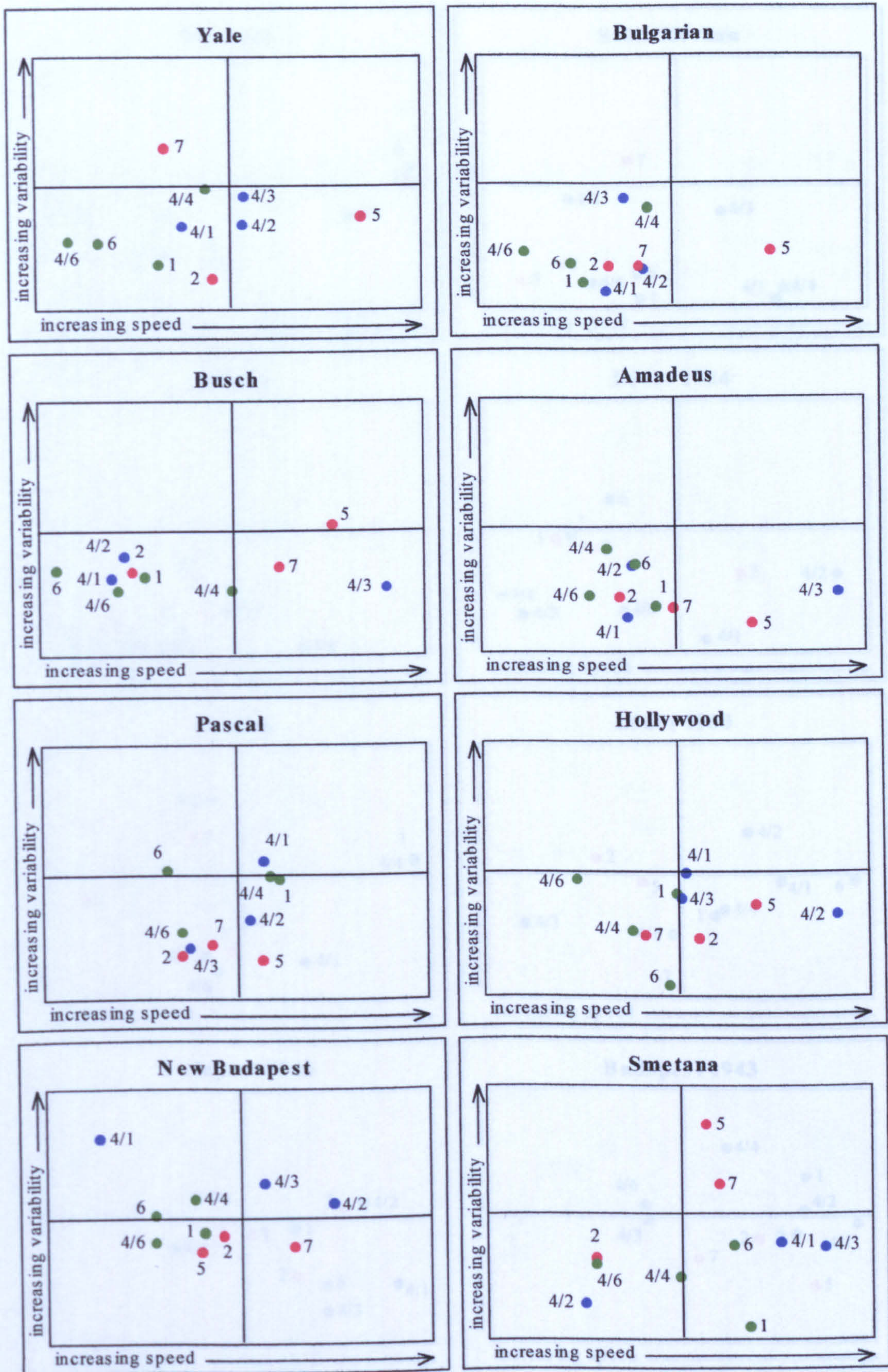


Fig. 6.1 (a) – Modal tempo plotted against average bar-to-bar percentage tempo difference for movements 1, 2, 4/1, 4/2, 4/3, 4/4, 4/6, 5, 6 and 7 of Op. 131, with scales recalibrated from 0 – 100 according to overall minimum and maximum values observed.

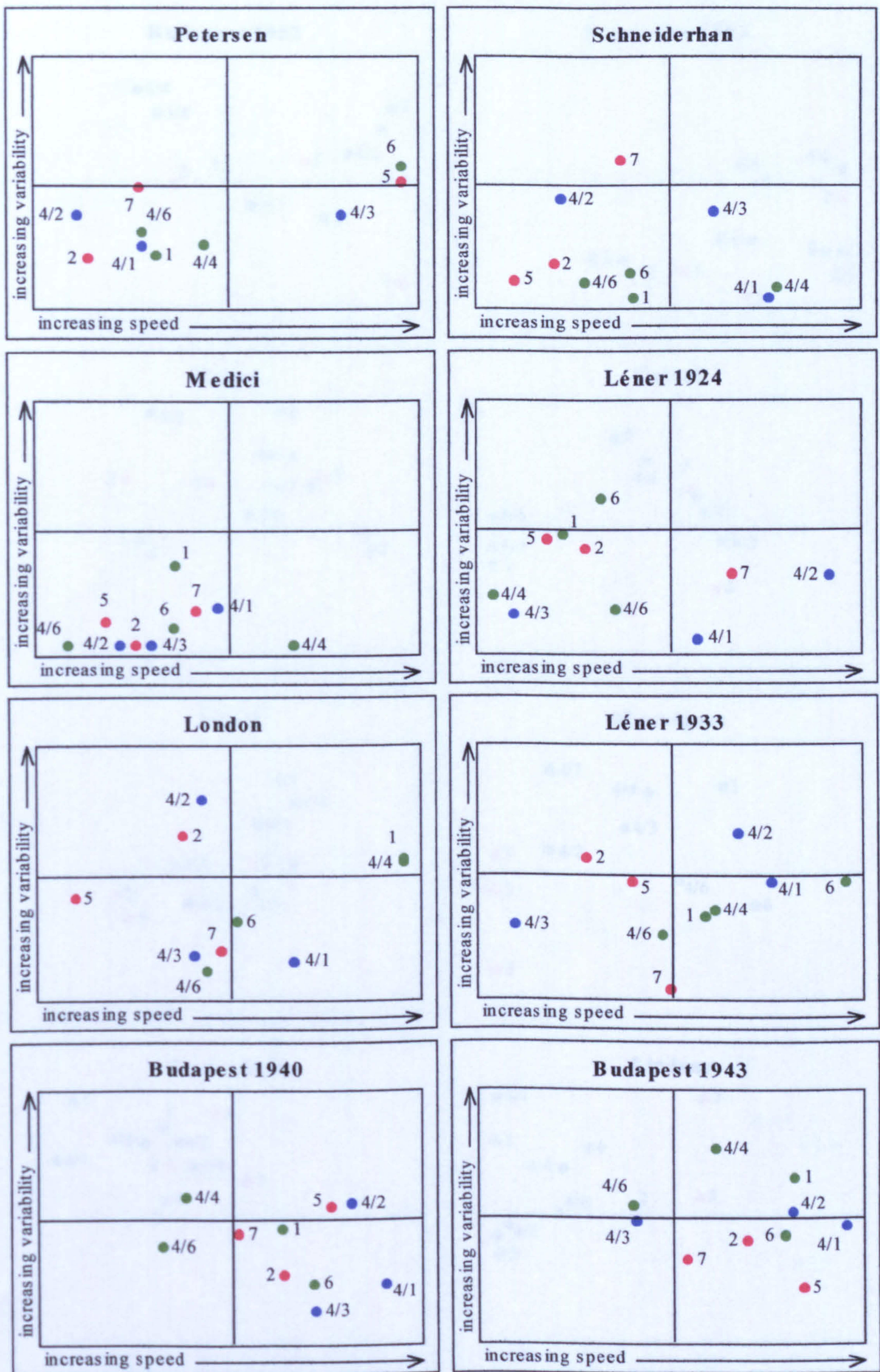


Fig. 6.1 (b) – Modal tempo plotted against average bar-to-bar percentage tempo difference for movements 1, 2, 4/1, 4/2, 4/3, 4/4, 4/6, 5, 6 and 7 of Op. 131, with scales recalibrated from 0 – 100 according to overall minimum and maximum values observed

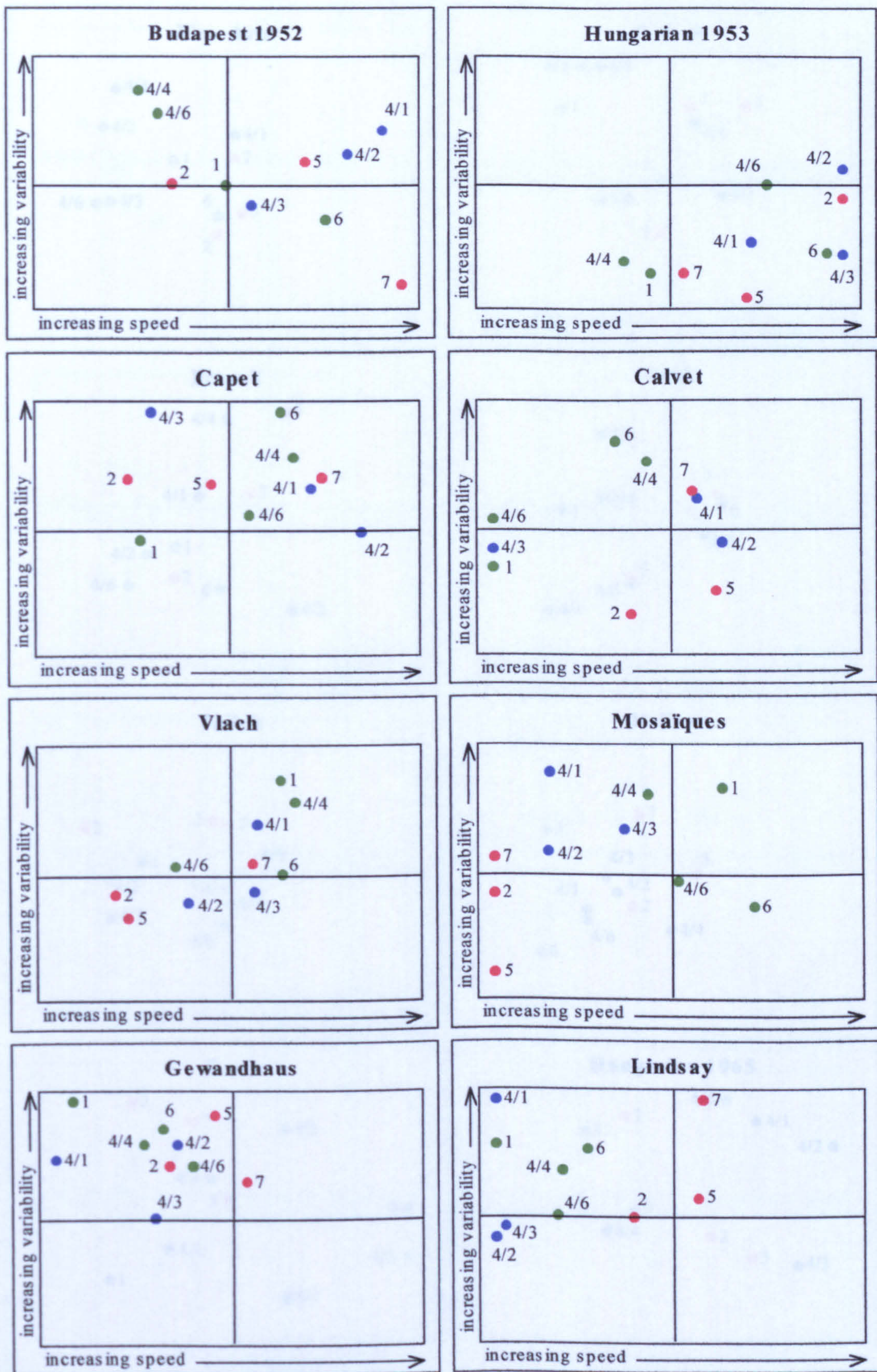


Fig. 6.1 (c) – Modal tempo plotted against average bar-to-bar percentage tempo difference for movements 1, 2, 4/1, 4/2, 4/3, 4/4, 4/6, 5, 6 and 7 of Op. 131, with scales recalibrated from 0 – 100 according to overall minimum and maximum values observed.

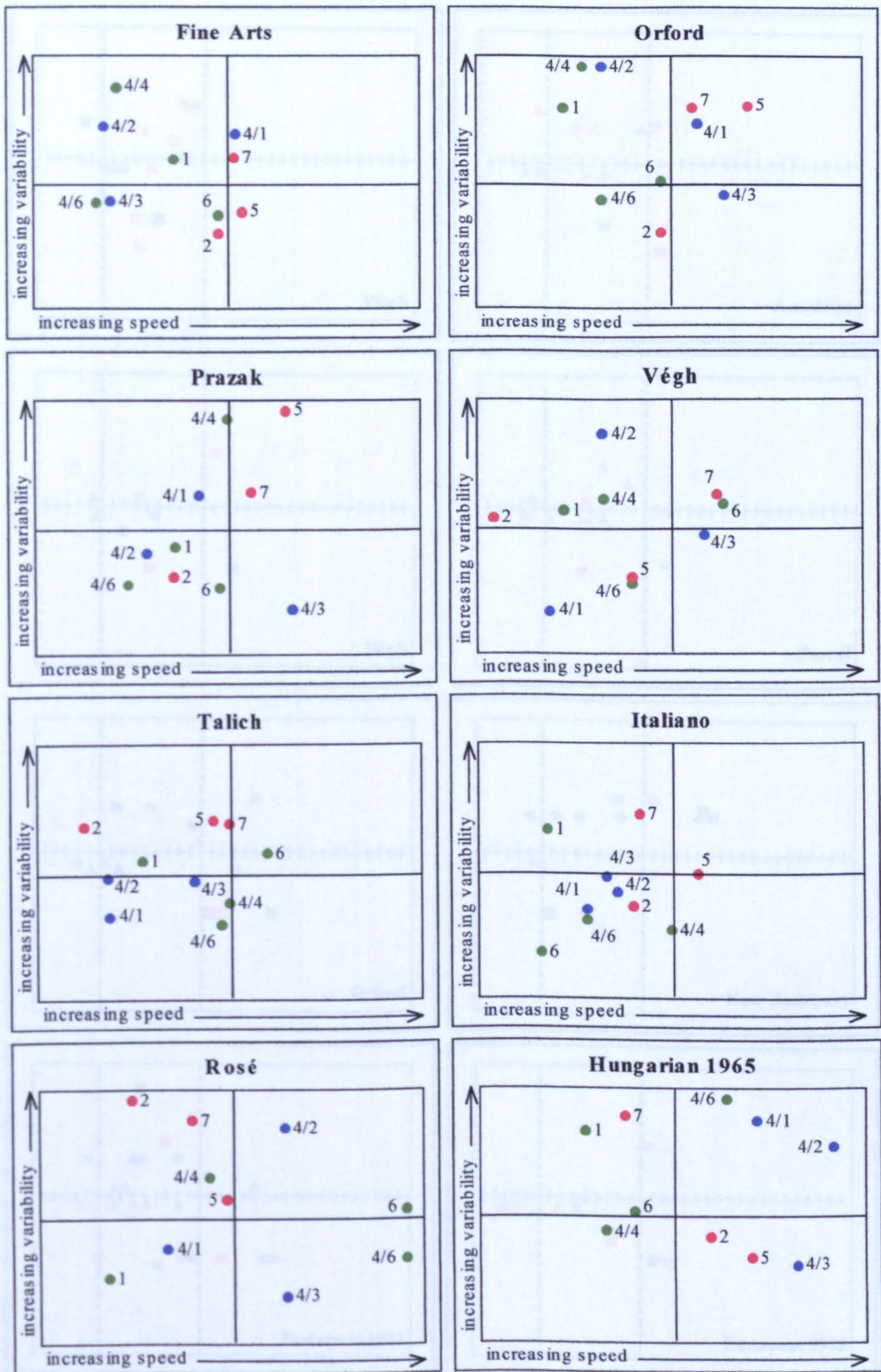


Fig. 6.1 (d) – Modal tempo plotted against average bar-to-bar percentage tempo difference for movements 1, 2, 4/1, 4/2, 4/3, 4/4, 4/6, 5, 6 and 7 of Op. 131, with scales recalibrated from 0 – 100 according to overall minimum and maximum values observed.

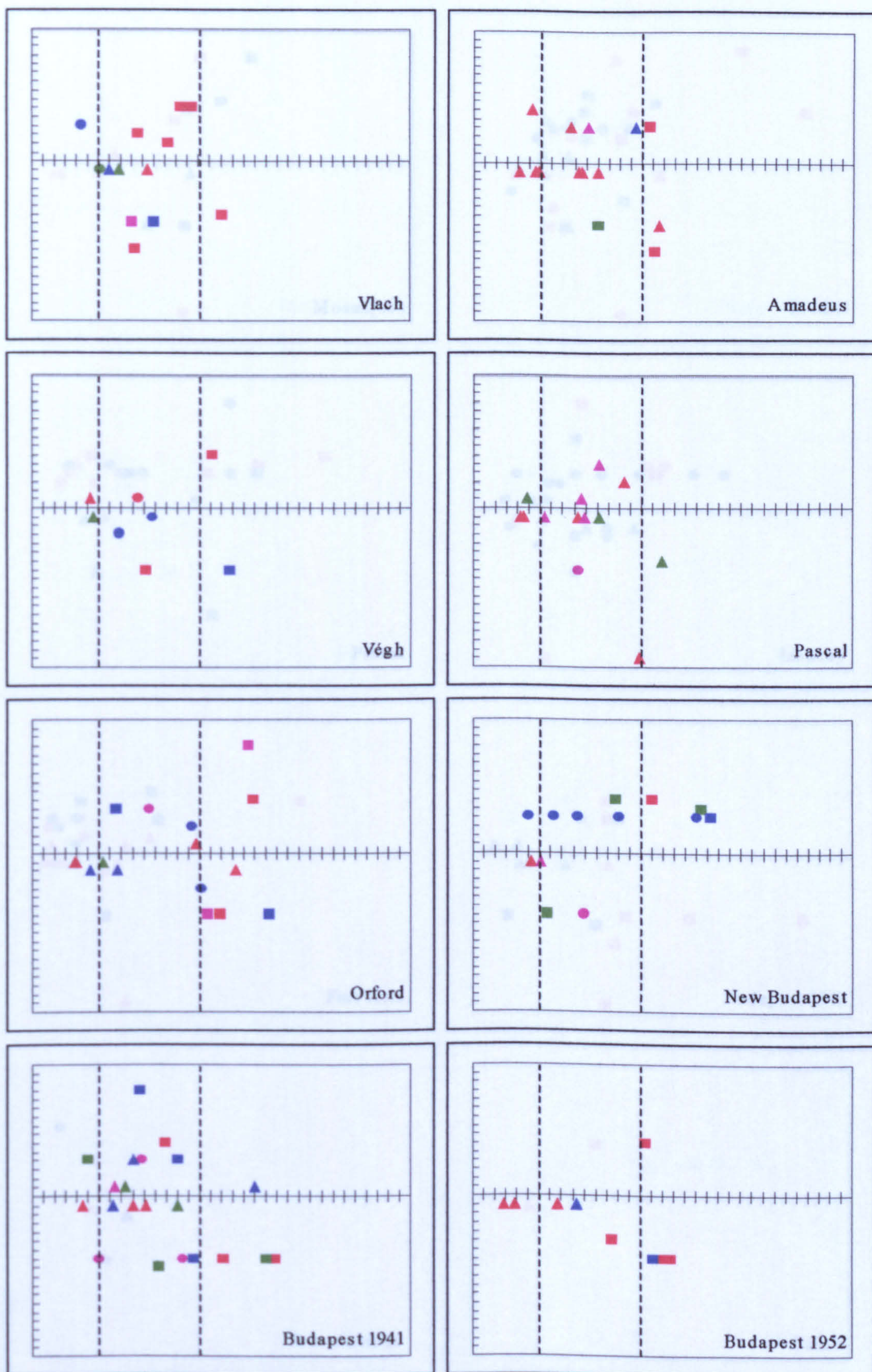


Fig. 7.1 (a) – First movement – portamento occurrences plotted by interval and duration. For legend and key, see text in Volume 1, p. 189

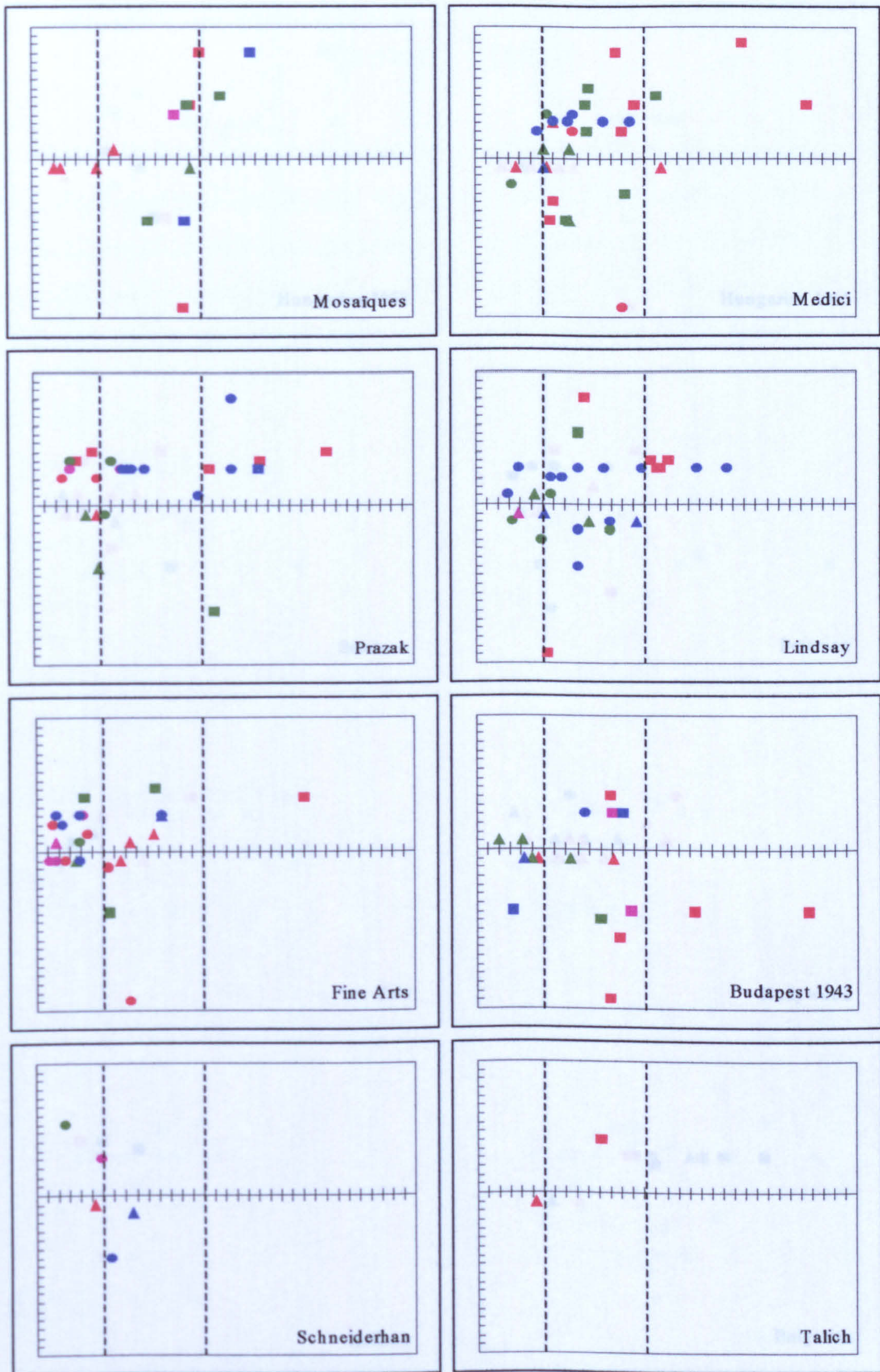


Fig. 7.1 (b) – First movement – portamento occurrences plotted by interval and duration. For legend and key, see text in Volume 1, p. 189

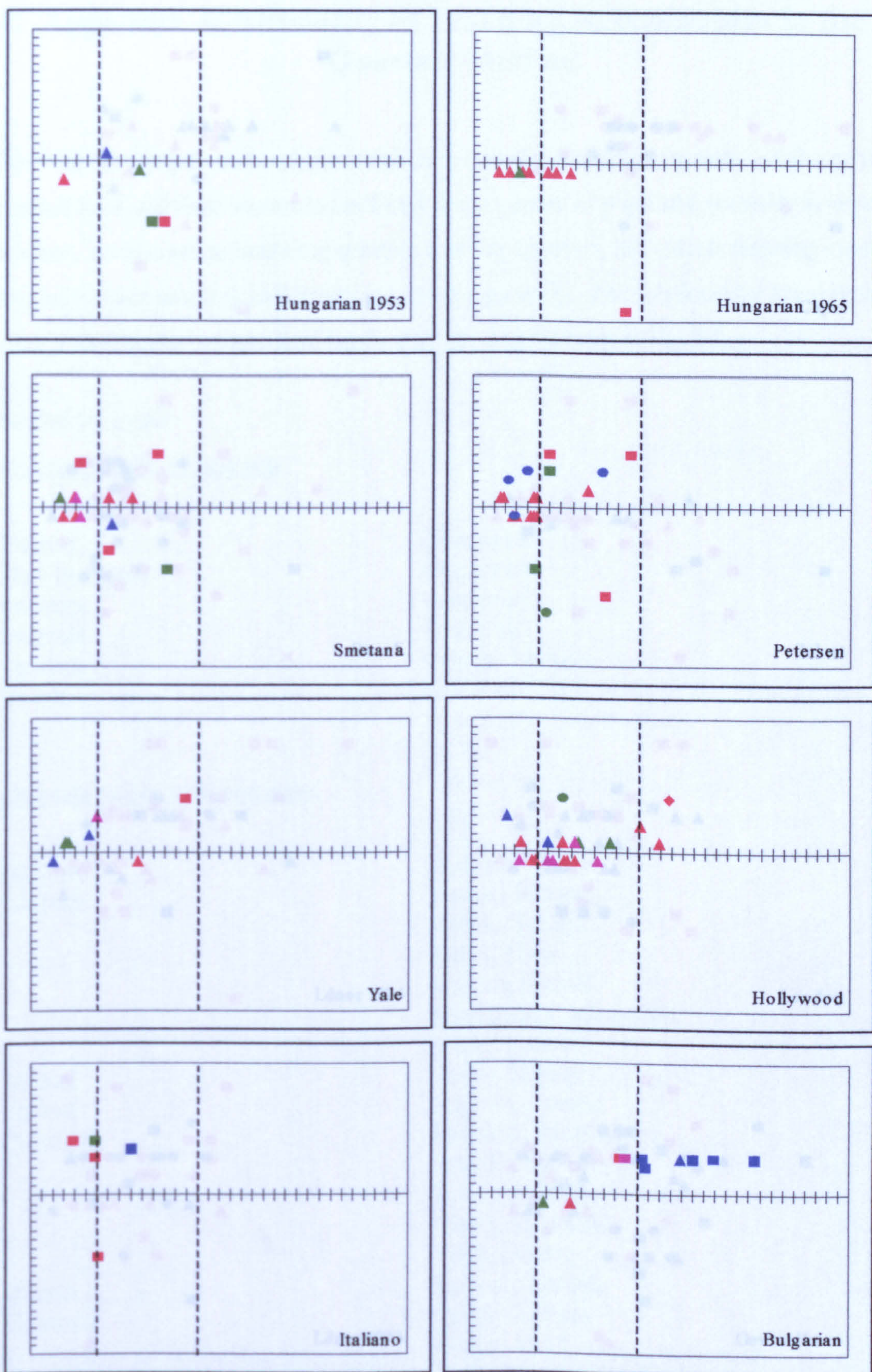


Fig. 7.1 (c) – First movement – portamento occurrences plotted by interval and duration. For legend and key, see text in Volume 1, p. 189

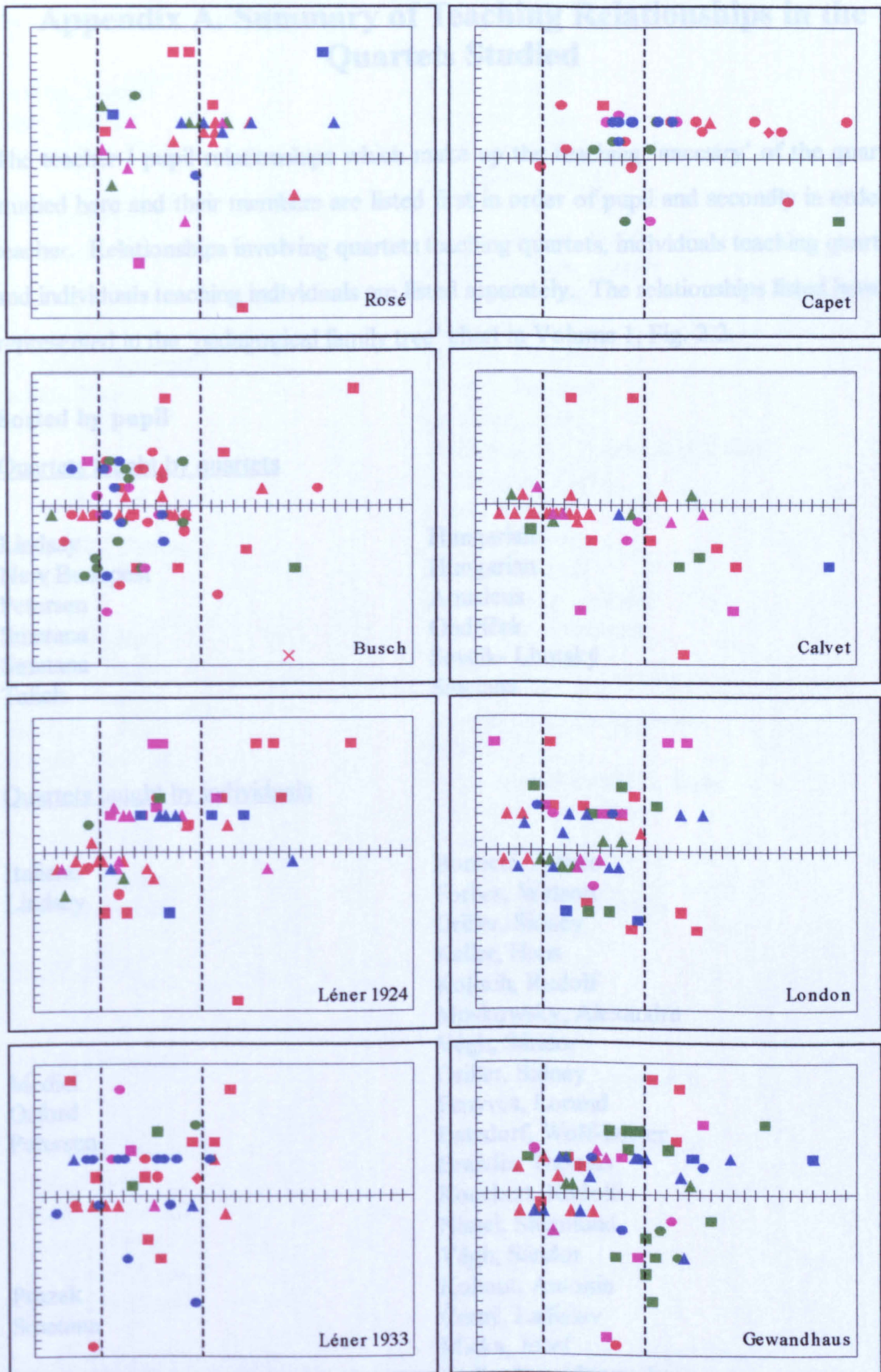


Fig. 7.1 (d) – First movement – portamento occurrences plotted by interval and duration. For legend and key, see text in Volume 1, p. 189

Appendix A. Summary of Teaching Relationships in the Quartets Studied

The teacher / pupil relationships which make up the teaching 'ancestry' of the quartets studied here and their members are listed first in order of pupil and secondly in order of teacher. Relationships involving quartets teaching quartets, individuals teaching quartets, and individuals teaching individuals are listed separately. The relationships listed here are represented in the 'pedagogical family tree' chart in Volume 1, Fig. 2.2.

Sorted by pupil

Quartets taught by quartets

Lindsay	Hungarian
New Budapest	Hungarian
Petersen	Amadeus
Smetana	Ondříček
Smetana	Ševčík- Lhotský
Talich	Smetana

Quartets taught by individuals

Italiano	Bonucci, Arturo
Lindsay	Forbes, Watson
	Griller, Sidney
	Keller, Hans
	Kolisch, Rudolf
	Moskowsky, Alexandre
	Végh, Sándor
Medici	Griller, Sidney
Orford	Fenyvès, Lorand
Petersen	Batzdorf, Wolf-Dieter
	Brandis, Thomas
	Koeckert, Rudolf
	Nissel, Siegmund
	Végh, Sándor
Prazak	Kohout, Antonín
Smetana	Černý, Ladislav
	Micka, Josef
	Sádlo, Karel Pravoslav

Individuals taught by individuals

Achron, Joseph
Aller, Eleanor
Andreasson, Gösta

Auer, Leopold

Bachrich, Sigismund
Baillot, Pierre
Becker, Hugo

Bennewitz, Anton
Blinder, Naum

Boehm, Joseph
Borciani, Paolo
Botvay, Károly
Boucherit, Jules
Brainin, Norbert

Brandis, Thomas
Brodsky, Adolf

Busch, Adolf

Busch, Hermann

Buxbaum, Friedrich
Capet, Lucien
Caudella, Eduard
Cropper, Peter
Cros-Saint-Ange
David, Ferdinand

Davidov, Karl Youlievitch

de Beriot, Charles-Auguste

Auer, Leopold
Salmond, Felix
Auer, Leopold
Ruthström, Julius
Dont, Jacob
Hellmesberger, Georg
Hellmesberger, Joseph
Joachim, Joseph
Ridley-Kohne
Boehm, Joseph
Viotti, Giovanni
de Swert, Jules
Grützmacher, Friedrich Wilhelm
Kündinger, Kanut
Piatti, Alfredo
Mildner, Moritz
Brodsky, Adolf
Fiedelman, Alexander
Rode, Pierre Jacques
Serato, Arrigo
Weiner, Leo
Lefort, Narcisse Augustin
Flesch, Carl
Hochmann-Rosenfeld, Rosa
Odnoposov, Ricardo
Rostal, Max
Rostal, Max
Hellmesberger, Joseph
Laub, Ferdinand
Eldering, Bram
Hess, Willy
Steinbach, Fritz
Grümmer, Paul
Grützmacher, Friedrich jr.
Rendsburg
Hellmesberger, Ferdinand
Maurin, Jean Pierre
Vieuxtemps, Henri
Martin, David
Tolbecque, Auguste
Hauptmann, M
Spohr, Louis
Grützmacher, Friedrich Wilhelm
Hauptmann, M
Schubert, Karl
Baillot, Pierre

Delobelle, Camille
Dinkin, Alvin
Dont, Jacob

Dotzauer, Friedrich Justus
Dumont, Jacques
Durst, Mathias
Egghard, Julius
Eldering, Bram

Enesco, Georges

Evans, Charles Warwick
Fenyvès, Lorand
Feuermann, Emanuel

Fiedelman, Alexander

Fiedelman, Max
Fischer, Paul
Flesch, Carl

Forbes, Watson

Goltermann, Johann
Gorodetzky, Jac
Griller, Sidney

Grümmer, Paul

Grün, Jakob

Grützmacher, Friedrich jr.
Grützmacher, Friedrich Wilhelm
Guilevitch, Daniel

Roberrechts, Andre
Viotti, Giovanni
Cros-Saint-Ange
Bailly, Louis
Boehm, Joseph
Hellmesberger, Georg
Romberg, Bernhard
Boucherit, Jules
Boehm, Joseph
Durst, Mathias
Hubay, Jenö
Joachim, Joseph
Poortman
Bachrich, Sigismund
Caudella, Eduard
Hellmesberger, Joseph Jr.
Marsick, Martin Joseph Pierre
White, Joseph
Walenn, Herbert
Hubay, Jenö
Buxbaum, Friedrich
Klengel, Julius
Walter, Anton
Auer, Leopold
Brodsky, Adolf
Auer, Leopold
Grün, Jakob
Grün, Jakob
Marsick, Martin Joseph Pierre
Maxintsak, Joseph Ferdinand
Sauzay, Eugène
Hayward, Marjorie
Knocker, Editha
Sammons, Albert Edward
Ševčík, Otakar
Kummer, Friedrich August
Touret, André
Knocker, Editha
Tertis, Lionel
Wessely, Hans
Woof, Rowsby
Becker, Hugo
Klengel, Julius
Boehm, Joseph
Ellinger
Joachim, Joseph
Grützmacher, Friedrich Wilhelm
Drechsler, K
Brun, Alfred

Habeneck, François Antoine
Hartmann, Imre
Hauser, Miska

Hayot, Maurice
Hayward, Marjorie
Heermann, Hugo

Hegenbarth, Franz
Heissler, Karl

Hellmesberger, Georg
Hellmesberger, Joseph

Hellmesberger, Joseph Jr.
Hess, Willy

Hewitt, Maurice
Höbarth, Erich

Hochmann-Rosenfeld, Rosa
Hoffmann, Karel
Hubay, Jenő

Jaros, Bedrich
Joachim, Joseph

Junek, Julius
Klengel, Julius
Kocian, Jaroslav

Kodousek, Josef

Koeckert, Rudolf

Kohout, Antonín

Kolisch, Rudolf

Korguev, Sergei

Enesco, Georges
Rémy, Guillaume
Baillot, Pierre
Popper, David
Boehm, Joseph
Hellmesberger, Georg
Mayseder, Joseph
Massart, Rodolphe
Ševčík, Otakar
de Beriot, Charles-Auguste
Joachim, Joseph
Meerts, Lambert
Hüttner
Boehm, Joseph
Durst, Mathias
Hellmesberger, Georg
Boehm, Joseph
Boehm, Joseph
Hellmesberger, Georg
Hellmesberger, Joseph
Joachim, Joseph
Vieuxtemps, Henri
Lefort, Narcisse Augustin
Amohyl, Franz
Végh, Sándor
Grün, Jakob
Bennewitz, Anton
Joachim, Joseph
Vieuxtemps, Henri
Suk, Josef
Boehm, Joseph
David, Ferdinand
Hauser, Miska
Hellmesberger, Georg
Szeraczinski
Wihan, Hanus
Hegar, Émile
Ševčík, Otakar
Zábrodsky, Josef
Daniel, Frantisek
Kubat, Norbert
Reissig, Rudolf
Kocian, Jaroslav
Kulenkampff, Georg
Jaros, Bedrich
Sádlo, Karel Pravoslav
Egghard, Julius
Ševčík, Otakar
Auer, Leopold

Koromzay, Dénes
Kostecky, Lubomir
Krotschak, Richard
Kroyt, Boris
Kulenkampff, Georg
Kummer, Friedrich August
Kündinger, Kanut
Kuttner, Michael
Lafont, Charles
Laub, Ferdinand
Léner, Jenő
Léonard, Hubert
Lhotský, Bohuslav
Loft, Abram
Lovett, Martin
Magyar, Gabor
Malkin, Ilya
Marsick, Martin Joseph Pierre
Mas, Paul
Massart, Lambert Joseph
Maurin, Jean Pierre
Mayseder, Joseph
Meerts, Lambert
Menter, Joseph
Mildner, Moritz
Mischakoff, Mischa
Mitterer, Anita
Moravec, Karel
Moskowsky, Alexandre
Moučka, Viktor

Flesch, Carl
Hubay, Jenő
Waldbauer, Imre
Daniel, Frantisek
Micka, Josef
Grümmer, Paul
Fiedelman, Alexander
Fiedelman, Max
Stupka, Frantisek
Hess, Willy
Wendel, Ernst
Dotzauer, Friedrich Justus
Menter, Joseph
Hubay, Jenő
Weiner, Leo
Kreutzer, Rodolphe
Rode, Pierre Jacques
Mildner, Moritz
Hubay, Jenő
Habeneck, François Antoine
Ševčík, Otakar
Dittler, Herbert
James, Ivor
Friss, Anton
Kodály, Zoltan
Weiner, Leo
Auer, Leopold
Heynberg, Desiré
Joachim, Joseph
Léonard, Hubert
Massart, Rodolphe
Capet, Lucien
Cros-Saint-Ange
Kreutzer, Rodolphe
Baillot, Pierre
Guérin, Antoine
Habeneck, François Antoine
Suchs
Wranitzky, Anton
Baillot, Pierre
Habeneck, François Antoine
Lafont, Charles
Moralt, Philipp
Pixis, Friedrich Wilhelm
Korguev, Sergei
Végh, Sándor
Ševčík, Otakar
Auer, Leopold
Sádlo, Karel Pravoslav

Nissel, Siegmund	Rostal, Max
Novák, Jiří	Weissgarber, Max
Odnoposov, Ricardo	Hoffmann, Karel
Palotai, Vilmos	Kocian, Jaroslav
Pixis, Friedrich Wilhelm	Demán, Rudolf
Plocka, Alexander	Flesch, Carl
Popper, David	Becker, Hugo
Procházka, Karel	Schiffer, Adolf
Rebner, Adolf	Franzel, Ferdinand
Rémy, Guillaume	Kocian, Jaroslav
Ridley-Kohne	Ševčík, Otakar
Rode, Pierre Jacques	Goltermann, Johann
Roisman, Joseph	Ševčík, Otakar
Rosé, Arnold	Grün, Jakob
Rostal, Max	Laforge
Roth, Sandor	Marsick, Martin Joseph Pierre
Ruthström, Julius	Léonard, Hubert
Sádlo, Karel Pravoslav	Massart, Rodolphe
Saidenberg, Daniel	Boehm, Joseph
Sammons, Albert Edward	Viotti, Giovanni
Saunders, John	Blinder, Naum
Sauzay, Eugène	Fiedelman, Alexander
Schidlof, Peter	Stolyarsky, Peter
Schneider, Alexander	Stupka, Frantisek
Schneider, Mischa	Heissler, Karl
Schneiderhan, Wolfgang	Flesch, Carl
Schubert, Karl	Rosé, Arnold
Ševčík, Otakar	Hubay, Jenő
Shure, Paul	Joachim, Joseph
	Zelenka, Ladislav
	Hekking, Andre
	Salmond, Felix
	Hill, Frederick Weist
	Saunders, John
	Carrodus, Bernhard Molique
	Hollander, Benno
	Molique, Bernhard
	Baillot, Pierre
	Rostal, Max
	Flesch, Carl
	Malkin, Ilya
	Rebner, Adolf
	Alexanian, Dmitri
	Klengel, Julius
	Ševčík, Otakar
	Winkler, Julius
	Dotzauer, Friedrich Justus
	Bennewitz, Anton
	Achron, Joseph

Škampa, Milan

Slatkin, Felix
Smilovits, Joseph
Snítíl, Václav

Sopkin, George

Sorkin, Leonard
Spohr, Louis
Suk, Josef

Székely, Zoltán
Tertis, Lionel

Tolbecque, Auguste
Tourret, André

Végh, Sándor

Vieuxtemps, Henri
Vlach, Josef

Walenn, Herbert
Wessely, Hans
Wihan, Hanus

Wollgandt, Edgar
Zábrodsky, Josef
Zelenka, Ladislav

Zimbalist, Efrem

Černý, Ladislav
Daniel, Frantisek
Plocka, Alexander
Zimbalist, Efrem
Hubay, Jenő
Kocian, Jaroslav
Pekelsky, Jaroslav
Feuermann, Emanuel
Saidenberg, Daniel
Mischakoff, Mischa
Kunisch, Gottfried
Bennewitz, Anton
Kocian, Jaroslav
Wihan, Hanus
Hubay, Jenő
Carrodus, Bernhard Molique
Wessely, Hans
Vaslin, Olive Charlier
Brun, Alfred
Hayot, Maurice
Lefort, Narcisse Augustin
Hubay, Jenő
Weiner, Leo
de Beriot, Charles-Auguste
Cerny, Ladislav
Micka, Josef
Novák, Stanislav
Slais, Jan
Becker, Hugo
Grün, Jakob
Davidov, Karl Youlievitch
Hegenbarth, Franz
Heermann, Hugo
Bennewitz, Anton
Becker, Hugo
Wihan, Hanus
Auer, Leopold

Sorted by teacher

Quartets teaching quartets

Amadeus
Hungarian

Ondříček

Petersen
Lindsay
New Budapest
Smetana

Ševčík-Lhotský
Smetana

Smetana
Talich

Individuals teaching quartets

Batzdorf, Wolf-Dieter
Bonucci, Arturo
Brandis, Thomas
Černý, Ladislav
Fenyvès, Lorand
Forbes, Watson
Griller, Sidney

Keller, Hans
Koeckert, Rudolf
Kohout, Antonín
Kolisch, Rudolf
Micka, Josef
Moskowsky, Alexandre
Nissel, Siegmund
Sádlo, Karel Pravoslav
Végh, Sándor

Petersen
Italiano
Petersen
Smetana
Orford
Lindsay
Lindsay
Medici
Lindsay
Petersen
Prazak
Lindsay
Smetana
Lindsay
Petersen
Smetana
Lindsay
Petersen

Individuals teaching individuals

Achron, Joseph
Alexanian, Dmitri
Amohyl, Franz
Auer, Leopold

Bachrich, Sigismund
Baillot, Pierre

Bailly, Louis
Becker, Hugo

Shure, Paul
Schneider, Mischa
Höbarth, Erich
Achron, Joseph
Andreasson, Gösta
Fiedelman, Alexander
Fiedelman, Max
Korguev, Sergei
Malkin, Ilya
Moskowsky, Alexandre
Zimbalist, Efrem
Enesco, Georges
de Beriot, Charles-Auguste
Habeneck, François Antoine
Maurin, Jean Pierre
Meerts, Lambert
Sauzay, Eugène
Dinkin, Alvin
Grümmer, Paul

Bennewitz, Anton

Blinder, Naum
Boehm, Joseph

Boucherit, Jules
Brodsky, Adolf

Brun, Alfred

Buxbaum, Friedrich
Capet, Lucien
Carrodus, Bernhard Molique

Caudella, Eduard
Černý, Ladislav

Cros-Saint-Ange

Daniel, Frantisek

David, Ferdinand
Davidov, Karl Youlievitch
de Beriot, Charles-Auguste

de Swert, Jules
Deman, Rudolf
Dittler, Herbert
Dont, Jacob
Dotzauer, Friedrich Justus

Drechsler, K
Durst, Mathias

Egghard, Julius

Palotai, Vilmos
Walenn, Herbert
Zelenka, Ladislav
Hoffmann, Karel
Ševčík, Otakar
Suk, Josef
Zábrodsky, Josef
Roisman, Joseph
Bachrich, Sigismund
Dont, Jacob
Durst, Mathias
Grün, Jakob
Hauser, Miska
Heissler, Karl
Hellmesberger, Georg
Hellmesberger, Joseph
Joachim, Joseph
Ridley-Kohne
Dumont, Jacques
Blinder, Naum
Fiedelman, Alexander
Guilevitch, Daniel
Tourret, André
Feuermann, Emanuel
Mas, Paul
Saunders, John
Tertis, Lionel
Enesco, Georges
Škampa, Milan
Vlach, Josef
Delobelle, Camille
Mas, Paul
Kod'ousek, Josef
Kostecky, Lubomir
Škampa, Milan
Joachim, Joseph
Wihan, Hanus
Heermann, Hugo
Vieuxtemps, Henri
Becker, Hugo
Odnoposov, Ricardo
Loft, Abram
Auer, Leopold
Kummer, Friedrich August
Schubert, Karl
Grützmacher, Friedrich Wilhelm
Egghard, Julius
Heissler, Karl
Kolisch, Rudolf

Eldering, Bram
Ellinger
Enesco, Georges
Feuermann, Emanuel
Fiedelman, Alexander

Fiedelman, Max
Flesch, Carl

Franzel, Ferdinand
Friss, Anton
Goltermann, Johann
Grümmer, Paul

Grün, Jakob

Grütmacher, Friedrich jr.
Grütmacher, Friedrich Wilhelm

Guérin, Antoine
Habeneck, François Antoine

Hauptmann, M

Hauser, Miska
Hayot, Maurice
Hayward, Marjorie
Heermann, Hugo
Hegar, Émile
Hegenbarth, Franz
Heissler, Karl
Hekking, Andre
Hellmesberger, Ferdinand
Hellmesberger, Georg

Hellmesberger, Joseph

Busch, Adolf
Grün, Jakob
Guilevitch, Daniel
Sopkin, George
Blinder, Naum
Kroyt, Boris
Roisman, Joseph
Kroyt, Boris
Brainin, Norbert
Koromzay, Dénes
Odnoposov, Ricardo
Rostal, Max
Schneider, Alexander
Pixis, Friedrich Wilhelm
Magyar, Gabor
Popper, David
Busch, Hermann
Krotschak, Richard
Fischer, Paul
Flesch, Carl
Hochmann-Rosenfeld, Rosa
Rebner, Adolf
Wessely, Hans
Busch, Hermann
Becker, Hugo
Davidov, Karl Youlievitch
Grütmacher, Friedrich jr.
Maurin, Jean Pierre
Léonard, Hubert
Maurin, Jean Pierre
Meerts, Lambert
David, Ferdinand
Davidov, Karl Youlievitch
Joachim, Joseph
Tourret, André
Forbes, Watson
Wollgandt, Edgar
Klengel, Julius
Wihan, Hanus
Rosé, Arnold
Saidenberg, Daniel
Buxbaum, Friedrich
Auer, Leopold
Dont, Jacob
Hauser, Miska
Heissler, Karl
Hellmesberger, Joseph
Joachim, Joseph
Auer, Leopold

Hellmesberger, Joseph Jr.
Hess, Willy

Heynberg, Desiré
Hill, Frederick Weist
Hochmann-Rosenfeld, Rosa
Hoffmann, Karel
Hollander, Benno
Hubay, Jenő

Hüttner
James, Ivor
Jaros, Bedrich
Joachim, Joseph

Klengel, Julius

Knocker, Editha

Kocian, Jaroslav

Kodály, Zoltan
Korguev, Sergei
Kreutzer, Rodolphe

Kubat, Norbert
Kulenkampff, Georg
Kummer, Friedrich August
Kündinger, Kanut
Kunisch, Gottfried

Brodsky, Adolf
Hellmesberger, Joseph Jr.
Enesco, Georges
Busch, Adolf
Kulenkampff, Georg
Marsick, Martin Joseph Pierre
Sammons, Albert Edward
Brainin, Norbert
Novák, Jiří
Saunders, John
Eldering, Bram
Fenyvès, Lorand
Koromzay, Dénes
Kuttner, Michael
Léner, Jenő
Roth, Sandor
Smilovits, Joseph
Székely, Zoltán
Végh, Sándor
Hegenbarth, Franz
Lovett, Martin
Kohout, Antonín
Auer, Leopold
Eldering, Bram
Grün, Jakob
Heermann, Hugo
Hess, Willy
Hubay, Jenő
Marsick, Martin Joseph Pierre
Ruthström, Julius
Feuermann, Emanuel
Grümmer, Paul
Schneider, Mischa
Forbes, Watson
Griller, Sidney
Koeckert, Rudolf
Novák, Jiří
Plocka, Alexander
Snítil, Václav
Suk, Josef
Magyar, Gabor
Mischakoff, Mischa
Lafont, Charles
Massart, Lambert Joseph
Kodousek, Josef
Koeckert, Rudolf
Goltermann, Johann
Becker, Hugo
Spohr, Louis

Lafont, Charles
Laforge
Laub, Ferdinand
Lefort, Narcisse Augustin

Léonard, Hubert

Malkin, Ilya
Marsick, Martin Joseph Pierre

Martin, David
Massart, Rodolphe

Maurin, Jean Pierre
Maxintsak, Joseph Ferdinand
Mayseder, Joseph
Meerts, Lambert
Menter, Joseph
Micka, Josef

Mildner, Moritz

Mischakoff, Mischa
Molique, Bernhard
Moralt, Philipp
Novák, Stanislav
Odnoposov, Ricardo
Pekelsky, Jaroslav
Piatti, Alfredo
Pixis, Friedrich Wilhelm
Plocka, Alexander
Poortman
Popper, David
Rebner, Adolf
Reissig, Rudolf
Rémy, Guillaume
Rendsburg
Ridley-Kohne
Roberrechts, Andre
Rode, Pierre Jacques

Romberg, Bernhard
Rosé, Arnold
Rostal, Max

Meerts, Lambert
Rebner, Adolf
Brodsky, Adolf
Boucherit, Jules
Hewitt, Maurice
Tourret, André
Marsick, Martin Joseph Pierre
Rémy, Guillaume
Schneider, Alexander
Enesco, Georges
Flesch, Carl
Rebner, Adolf
Cropper, Peter
Hayot, Maurice
Marsick, Martin Joseph Pierre
Rémy, Guillaume
Capet, Lucien
Flesch, Carl
Hauser, Miska
Heermann, Hugo
Kündinger, Kanut
Kostecky, Lubomir
Vlach, Josef
Bennewitz, Anton
Laub, Ferdinand
Sorkin, Leonard
Saunders, John
Menter, Joseph
Vlach, Josef
Brainin, Norbert
Snítíl, Václav
Becker, Hugo
Mildner, Moritz
Škampa, Milan
Eldering, Bram
Hartmann, Imre
Schneider, Alexander
Kod'ousek, Josef
Guilevitch, Daniel
Busch, Hermann
Auer, Leopold
de Beriot, Charles-Auguste
Boehm, Joseph
Lafont, Charles
Dotzauer, Friedrich Justus
Rostal, Max
Brainin, Norbert
Brandis, Thomas
Nissel, Siegmund

Ruthström, Julius
Sádlo, Karel Pravoslav

Saidenberg, Daniel
Salmond, Felix

Sammons, Albert Edward
Saunders, John
Sauzay, Eugène
Schiffer, Adolf
Schubert, Karl
Serato, Arrigo
Ševčík, Otakar

Slais, Jan
Spohr, Louis
Steinbach, Fritz
Stolyarsky, Peter
Stupka, Frantisek

Suchs
Suk, Josef
Szeraczinski
Tertis, Lionel
Tolbecque, Auguste
Touret, André
Vaslin, Olive Charlier
Végh, Sándor

Vieuxtemps, Henri

Viotti, Giovanni

Waldbauer, Imre
Walenn, Herbert
Walter, Anton
Weiner, Leo

Schidlof, Peter
Andreasson, Gösta
Kohout, Antonín
Moučka, Victor
Sopkin, George
Aller, Eleanor
Saidenberg, Daniel
Forbes, Watson
Sammons, Albert Edward
Flesch, Carl
Palotai, Vilmos
Davidov, Karl Youlievitch
Borciani, Paolo
Forbes, Watson
Hayward, Marjorie
Kocian, Jaroslav
Kolisch, Rudolf
Lhotský, Bohuslav
Moravec, Karel
Plocka, Alexander
Prochazka, Karel
Schneiderhan, Wolfgang
Vlach, Josef
David, Ferdinand
Busch, Adolf
Roisman, Joseph
Kroyt, Boris
Roisman, Joseph
Mayseder, Joseph
Jaros, Bedrich
Joachim, Joseph
Griller, Sidney
Cros-Saint-Ange
Gorodetzky, Jac
Tolbecque, Auguste
Höbarth, Erich
Mitterer, Anita
Caudella, Eduard
Hess, Willy
Hubay, Jenő
Baillot, Pierre
de Beriot, Charles-Auguste
Rode, Pierre Jacques
Koromzay, Dénes
Evans, Charles Warwick
Feuermann, Emanuel
Botvay, Károly
Kuttner, Michael
Magyar, Gabor

Weissgarber, Max
Wendel, Ernst
Wessely, Hans

White, Joseph
Wihan, Hanus

Winkler, Julius
Woof, Rowsby
Wranitzky, Anton
Zábrodsky, Josef
Zelenka, Ladislav
Zimbalist, Efrem

Végh, Sándor
Nissel, Siegmund
Kulenkampff, Georg
Griller, Sidney
Tertis, Lionel
Enesco, Georges
Junek, Julius
Suk, Josef
Zelenka, Ladislav
Schneiderhan, Wolfgang
Griller, Sidney
Mayseder, Joseph
Kocian, Jaroslav
Sádlo, Karel Pravoslav
Slatkin, Felix

Appendix B. Methodology for the collection of bar by bar inter-onset intervals

The collection of an accurate data set representing the inter-onset intervals of individual bars in a recorded performance of a string quartet poses a number of methodological problems. Researchers investigating basic features of expressivity in music performance using experimental performances are able to avoid these problems by recording the sample performances, which are usually of piano repertoire, on a keyboard using MIDI technology; the basic data for note onset timings are therefore available immediately in accurate form from the resultant MIDI data set (e.g. Repp, 1994a and Shaffer, 1995).

For a study of recorded performances of a string quartet, the main difficulty is in deriving accurate timings of the onset of appropriate events from recordings in a number of media (78 rpm shellac discs, 33 rpm vinyl discs, CDs, cassettes and DAT).

Cook, in his study of two performances of the first movement of Beethoven's Ninth Symphony (Cook, 1995), used a simple procedure involving tapping on a PC keyboard in time with the recorded performance, with the computer logging the precise timing of each keyboard tap. Cook himself recognises that these measurements (which showed an average error of around 3% on repeated tests) are not sufficiently accurate for conclusions on small transitions at the bar-to-bar level to be supported, but felt that they were adequate for 'inferences regarding the broad shaping of tempo' (Cook, 1995: 114).

This method is inadequate for the purposes attempted in this study, which addresses lower level tempo variation as well as broad tempo shaping. There are also a number of practical problems with this approach. Firstly, with this method there is only one opportunity to record the data accurately; it relies entirely on the ability of the researcher to depress keys in exact time with the performance. In the course of recording the data the tendency is for the researcher to anticipate the beat on the basis of the established and perceived tempo; if there is any change of tempo, it may be missed or at least minimised because of this anticipation. Secondly, there is no possibility of correcting the data. While it would be possible to alter some of the values on an intuitive basis, there would be no way of verifying the changes made.

The method chosen for this study uses MIDI technology. In it, the researcher plays the start of bar beats along with the recording on a MIDI keyboard. The MIDI keyboard is here being used merely to record a note onset, as with the key depressions in the first approach; no attempt is made to 'perform' the piece along with the recording being played back. The resultant MIDI recording is played back in synchronisation with the audio recording of the actual performance, and any discrepancies noted. These discrepancies are adjusted on the MIDI file using a PC MIDI sequencer program. The process is repeated until a satisfactory match with the real performance is obtained. By setting the MIDI configuration parameters appropriately, an accuracy of 1/1600th second can theoretically be achieved.

Those recordings on non-digital media (78 rpm shellac, 33 rpm vinyl and cassette) were transferred to DAT tape prior to this analysis. It was discovered that, due to the mechanical nature of the playback facility on these non-digital media, some minor variations in playing speed occur. These had the effect of causing the playback of the recording to become slightly out of phase with the simultaneous playback of the MIDI recording. The electronic timing mechanisms used with digital media ensured that the MIDI track could always be kept in phase with the DAT or CD recording.

This method is still open to a number of theoretical problems, and it is possible that, even though the MIDI recording is iteratively adjusted to match the performance as judged by the ear, there may still be some systematic error being introduced. While tapping in time with a performance, it is a natural tendency to anticipate beats based on the perception of an established tempo, and thus to iron out any actual delay that is present in the performance, or at least to transfer it to the following bar. Indeed, it is this kind of instance which most often needed correction after verifying the MIDI recording against the performance.

In order to test the accuracy of the method, the 1933 Léner Quartet performance of the fifth movement of the quartet was loaded onto a computer running the Sound Designer software package. This package allows the visual editing of the soundwave patterns against a time grid capable of resolution to milliseconds. By repeatedly playing the note event being timed at slow playback speeds it is possible to identify visually the onset of the note on the soundwave pattern to a high degree of accuracy and to derive a timing in

milliseconds. This method provides the highest possible degree of accuracy of measurement, although it is arguable that errors may still arise because of its dependency on the observer aurally correlating the perceived onset of the note with the visual sound wave display. However, the method is extremely labour intensive and could not be considered for a study involving thirty-two separate recordings of the entire quartet.

To compare the results obtained from this method with those obtained by the method actually adopted for the complete study, firstly the tempo map graphs for the movement derived from the two methods were overlaid. They were seen to give a very good visual match: most of the observable discrepancies occurred where there was no event on the downbeat of the bar. The onset on such bars was determined by intuitive tapping where the bar was felt to start in the MIDI method, whereas in the Sound Designer method, extrapolations were made based on the observed values of individual beats in the preceding bar. It could be argued that the MIDI method provides a more realistic measurement in these instances, as the algorithm used in the Sound Designer method was fairly crude, and has the effect of multiplying any slight discrepancy in the placement of a single beat.

To provide a more objective comparison, a number of statistical measures were taken for the two sets of data for two sections of the movement: these are one occurrence of the scherzo section (bars 167-234) and one of the trio section (bars 235-332). The results obtained are given below:

<u>Scherzo</u>	<i>Sound Designer</i>	<i>MIDI</i>
Mean metronome marking	100.11	100.00
Mode metronome marking	108	109
Standard deviation	19.53	19.11
Variance	381.54	365.15
<u>Trio</u>	<i>Sound Designer</i>	<i>MIDI</i>
Mean metronome marking	101.89	101.84
Mode metronome marking	101	101
Standard deviation	4.81	4.64
Variance	23.13	21.56

This table shows that the figures for mean and mode metronome marking are extremely close, while those for standard deviation and variance differ by between 2% and 6%.

The fact that this is one of the fastest movements in the quartet implies that these discrepancies are likely to be the worst case: any errors in placing the timing of the onset of an event are likely to be absolute rather than relative, and would therefore have proportionately less effect in slower movements, where the significant events are more widely spaced. The conclusion is that the chosen method is sufficiently accurate for analysing tempo and tempo variance at the bar-to-bar level.

Appendix C. Contents of Accompanying CD

1. iv, 162 - 177, Busch
2. iv, 162 - 177, Léner 1933
3. iv, 1 - 16, Budapest 1943
4. iv, 1 - 16, Gewandhaus
5. iv, 187 - 194, Yale
6. iv, 187 - 194, Mosaïques
7. v, 45 - 66, Yale
8. v, 45 - 66, Mosaïques
9. i, 72 - 94, Schneiderhan
10. i, 72 - 94, Hollywood
11. i, 72 - 94, Pascal
12. i, 45 - 72, Smetana
13. i, 45 - 72, Lindsay
14. i, 45 - 72, Léner 1933
15. vii, 367-388, Léner 1924
16. vii, 367-388, Capet
17. vii, 367-388, Medici
18. vii, 367-388, Orford
19. vii, 184-199, Talich
20. vii, 184-199, Gewandhaus
21. vi, Busch
22. vi, Yale
23. vi, Léner 1924
24. i, 20 - 24, Rosé
25. i, 20 - 24, Calvet
26. i, 70 - 79, Calvet
27. i, 70 - 79, Rosé
28. i, 98 - 113, Busch
29. i, 98 - 113, Capet
30. i, 98 - 113, Rosé
31. i, 98 - 113, Gewandhaus
32. i, 98 - 113, Léner 1933
33. i, 98 - 113, Léner 1924
34. i, 98 - 113, Calvet
35. i, 98 - 113, Medici
36. i, 98 - 113, New Budapest
37. i, 98 - 113, Schneiderhan
38. i, 81 - 83, Busch
39. vi, London
40. vi, Léner 1933
41. vi, Gewandhaus
42. vi, Busch
43. i, 1-4, Rosé
44. i, 1-4, Schneiderhan
45. i, 1-4, Amadeus
46. i, 1-4, Vlach
47. i, 1-4, Léner 1933
48. i, 1-4, Hungarian 1953
49. i, 1-16, Italiano
50. i, 1-16, Orford

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Zoltán Székely, Alexandre Moskowsky, Dénes Koromzay, Vilmos Palotai
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Jenő Léner, József Smilovits, Sándor Roth, Imre Hartmann
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Jenő Léner, József Smilovits, Sándor Roth, Imre Hartmann

- Lindsay Quartet, 1983? [ASV, LP, ACA 1014]**
Peter Cropper, Ronald Birks, Roger Bigley, Bernard Gregor-Smith
- London Quartet, 1925 [Vocalion, 78, K05138/41]**
[heavily cut; the following passages missing:
mvt 1 - second half, from bar 83 to end
mvt 4 - variation 5
 variation 6, bars 203-210
 coda, bars 242-271
mvt 5 - repeat, bars 20-67
 bars 163-328
 bars 499-500
mvt 7 - bars 124-159]
- Medici Quartet, March 1990, The Maltings, Snape, Aldeburgh [Nimbus, CD, NI5279]**
Paul Robertson, David Matthews, Ivo-Jan van der Werff, Anthony Lewis
- Mosaïques Quartet, 7 February 1995, Pebble Mill Studio, Birmingham [off-air recording of live broadcast, BBC Radio 3]**
Erich Höbarth, Andrea Bischof, Anita Mitterer, Christophe Coin
- New Budapest Quartet, November 1990 [Hyperion, CD, CDA66405]**
András Kiss, Ferenc Balogh, László Bársony, Károly Botvay
- Orford Quartet, May 1985, Emmanuel Presbyterian Church [Delos, CD, DE3036]**
Andrew Dawes, Kenneth Perkins, Terence Helmer, Denis Brott
- Pascal Quartet, 1951? [Nixa, LP, CLP1211]**
Jacques Dumont, Maurice Crut, Leon Pascal, Robert Salles
- Petersen Quartet, March 1994, Friedenskirche der Stephanus-Stiftung, Berlin-Weissensee [Capriccio, CD, 10 510]**
Conrad Muck, Gernot Süßmuth, Friedemann Weigle, Hans-Jakob Eschenburg
- Prazak Quartet, February 1991, Evangelic Church, Korunni 60, Prague [Nuova Era, CD, 7044]**
Vaclav Remes, Vlastimil Holec, Josef Kluson, Michal Kanka
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Arnold Rosé, Paul Fischer, Anton Ruzicka, Anton Walter [?]
- Schneiderhan Quartet, 8 September 1944, Musikverein, Vienna [Orfeo d'Or, CD, C315 931B]**
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Jiří Novák, Lubomir Kostecký, Milan Škampa, Antonín Kohout
- Talich Quartet, November 1978, Paris [Calliope, LP, CAL1638]**
Petr Messiereur, Jan Kvapil, Jan Talich, Evzen Rattay
- Végh Quartet, June 1973, La Chaux-de-Fonds [Auvidis Valois, CD, V4408]**
Sándor Végh, Sándor Zöldy, Georges Janzer, Paul Szabo

Vlach Quartet, 1962? [Supraphon, LP, SUA ST 50044]

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Yale Quartet, 1970, Vanguard's 23rd Street Studio, New York [Vanguard, CD, OVC5012]

Broadus Erle, Syoko Aki, David Schwartz, Aldo Parisot