Integrating Music Therapy Assessment:

From High-Level Reasoning to Computational Frameworks

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Music Therapy

Definition

*"Music therapy is a **reflexive process** wherein the **therapist helps the client to optimize the client's health, using various facets of music experience and the relationships formed through them as the impetus for change**." (Bruscia 2014, p. 36)*

Method	Receptive	Compositional	Improvisational	Re-creative
Characterisation	**Active Listening**	**Inclusion to Composition**	**Spontaneous Music Making**	**Reproduction of Material**
Areas/Abilities of Examination	overt movement, associations, memories or physiological relaxation response	expression, organisation, problem-solving, taking responsibility, communication	emotion exploration, **relationship development**, physical movements, initiate new ideas, aesthetic experience,	Sensorimotor skills, attention and reality orientation, memory skills, interactional and group skills, self-worth / achievement
Techniques	Song Discussion GIM (Bonny) Imaginal Listening Regulative Music Therapy	Songwriting Song Transformation	Referential Improvisation Non-Referential Improvisation Nordoff-Robbins Music Therapy **IPMT / IIMT**	Vocal Re-Creation Instrumental Re-Creation Musical Productions

- 2-player improvisation on digital pianos
- Depression Treatment (Erkkilä et al. 2021)

Wosch, T. (2013). Regulative music therapy (RMT). In K. H. Kirkland (Ed.), International Dictionary of Music Therapy (p. 111). Routledge.

Gardstrom, S., & Sorel, S. (2015). Music Therapy Methods. In B. L. Wheeler (Ed.), Music Therapy Handbook (pp. 116–132). The Guilford Press.

Bruscia, K. E. (2014). Defining Music Therapy (3rd edn). Barcelona Publishers.

Gattino, G. S. (2021). Essentials of Music Therapy Assessment. Forma & Conteúdo Comunicação Integrada.

Music Therapy Assessment

IAP – Autonomy Microanalysis
Thomas Wosch, 2002/2007

- *Development of Bruscia's 1987 "Autonomy" profile*
- *Assessment of Role behavior of client **and** therapist*
- ***Continuous** analysis of the improvisation*
- *Changes in interpersonal relationship in music*
- *6-step **rating scale** on **three musical levels***

	Time	00:06	00:18	00:28	00:34	00:40	00:50	00:55	1:06
Rhythmical Basis	Dependent								
	Follower					T	C		
	Partner								
	Leader	T			C	C	T		
	Resister		C, T	C,T	T			C,T	C,T
	Independent				T				
Melody	Dependent								
	Follower			C		C	C		
	Partner								
	Leader	T		T		T	T		
	Resister		C, T					C,T	C,T
	Independent								
Timbre	Dependent								
	Follower			C		T	C		C
	Partner								
	Leader	T	C	T		C	T	C	T
	Resister		T						
	Independent							T	

- *provides detailed insight into the interpersonal relationship mediated by the intermusical relationship*
- *application requires ~2 weeks / improvisation*
- ***automation enables applicability in research and clinical practice***

Bruscia, K. E. (1987). *Improvisational Models of Music Therapy*. C.C. Thomas.

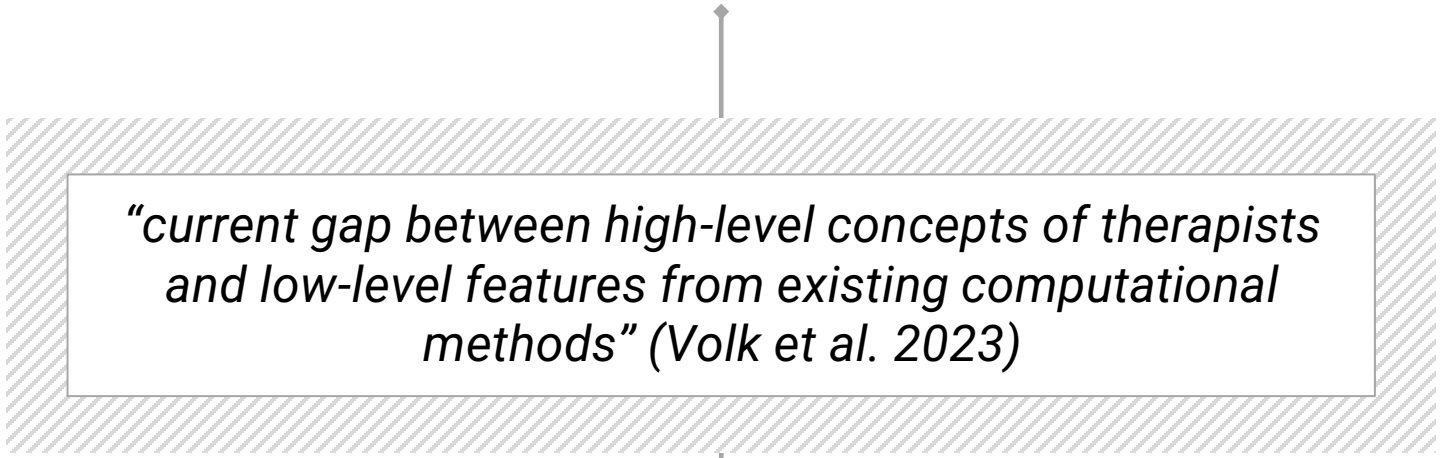
Wosch, T. (2002). *Emotionale Mikroprozesse musikalischer Interaktionen: Eine Einzelfallanalyse zur Untersuchung musiktherapeutischer Improvisationen* (Vol. 4). Waxmann.

Wosch, T. (2007). Microanalysis of Processes of Interactions in Clinical Improvisation with IAP-Autonomy. In T. Wosch & T. Wigram (Eds.), *Microanalysis in Music Therapy: Methods, Techniques and Applications for Clinicians, Researchers, Educators and Students* (1st American pbk, pp. 241–254). J. Kingsley.

Main Challenge

Autonomy *Relationship*

Emotion ***High-Level Concepts*** *Creativity*



“current gap between high-level concepts of therapists and low-level features from existing computational methods” (Volk et al. 2023)

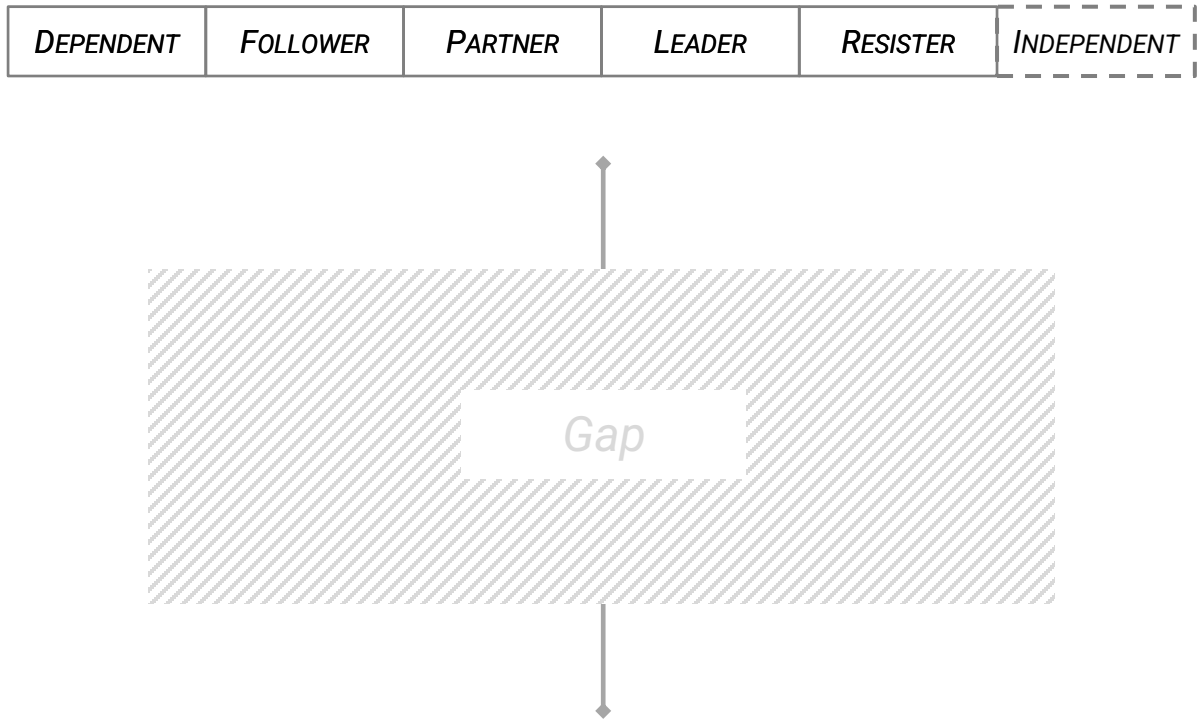
Low-Level Features

Volume *Rhythm*

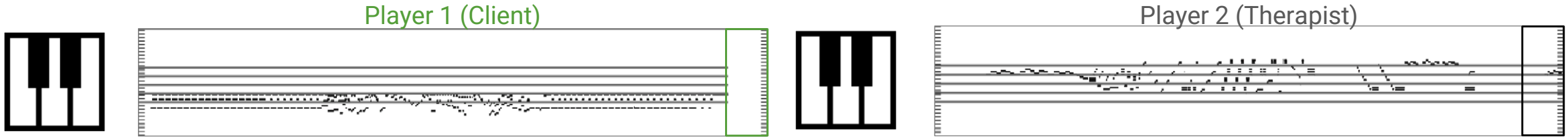
Tempo *Pitch*

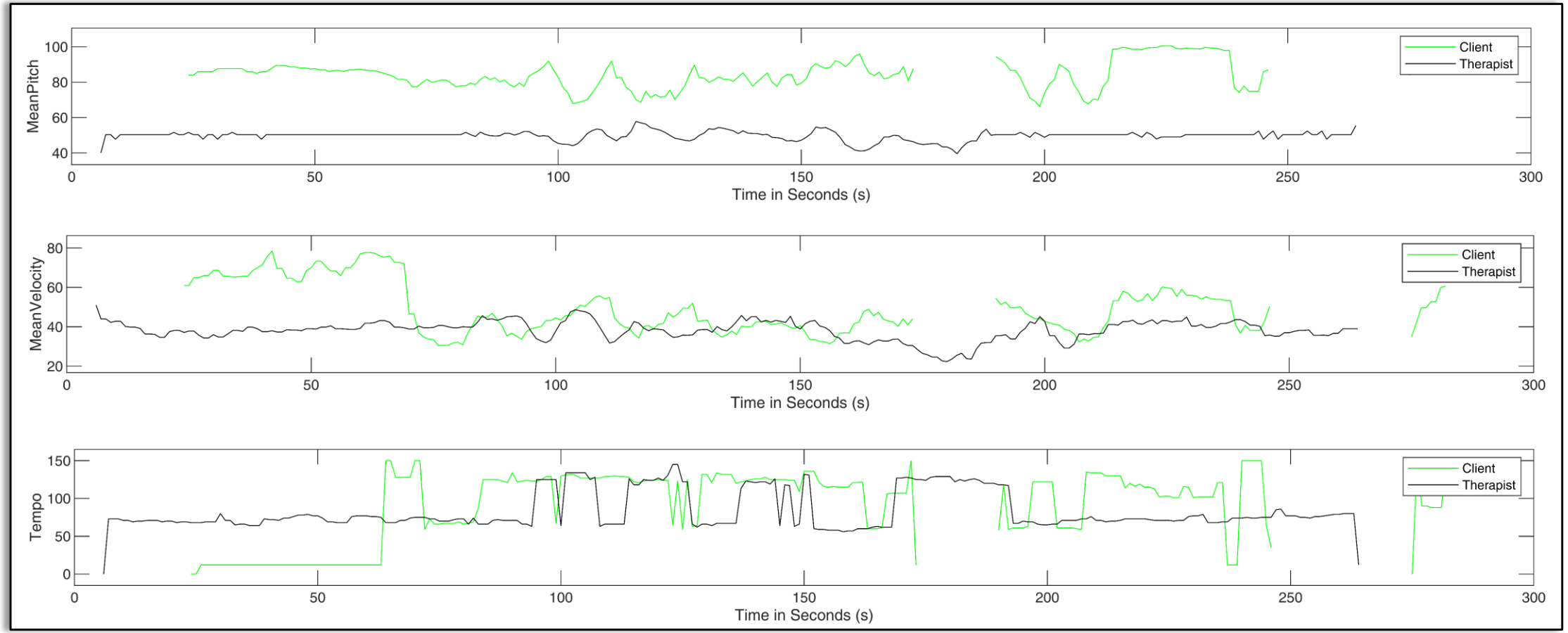
Volk, A., Veldhuis, T., Foubert, Katrien, & De Backer, J. (2023). Towards computational music analysis for music therapy. 247–256.

Main Challenge



Music Therapy Toolbox





Erkkilä, J., & Wosch, T. (2019). The Music Therapy Toolbox. In S. L. Jacobsen, E. G. Waldon, & G. Gattino (Eds), Music Therapy Assessment: Theory, Research, and Application (pp. 293–314). Jessica Kingsley Publishers.

Erkkilä, J. (2007). Music Therapy Toolbox (MTTB)—An Improvisation Analysis Tool for Clinicians and Researchers. In T. Wosch & T. Wigram (Eds), Microanalysis in Music Therapy: Methods, Techniques and Applications for Clinicians, Researchers, Educators and Students (pp. 134–148). Jessica Kingsley Publishers.

Main Challenge

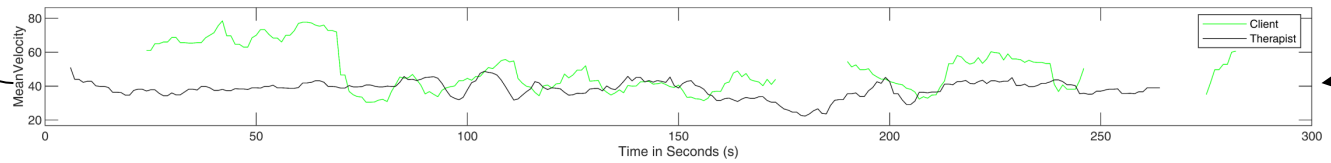
Structuring "Musical Interaction"

DEPENDENT | *FOLLOWER* | *PARTNER* | *LEADER* | *RESISTER* | *INDEPENDENT*

Gap

Supervised Machine Learning

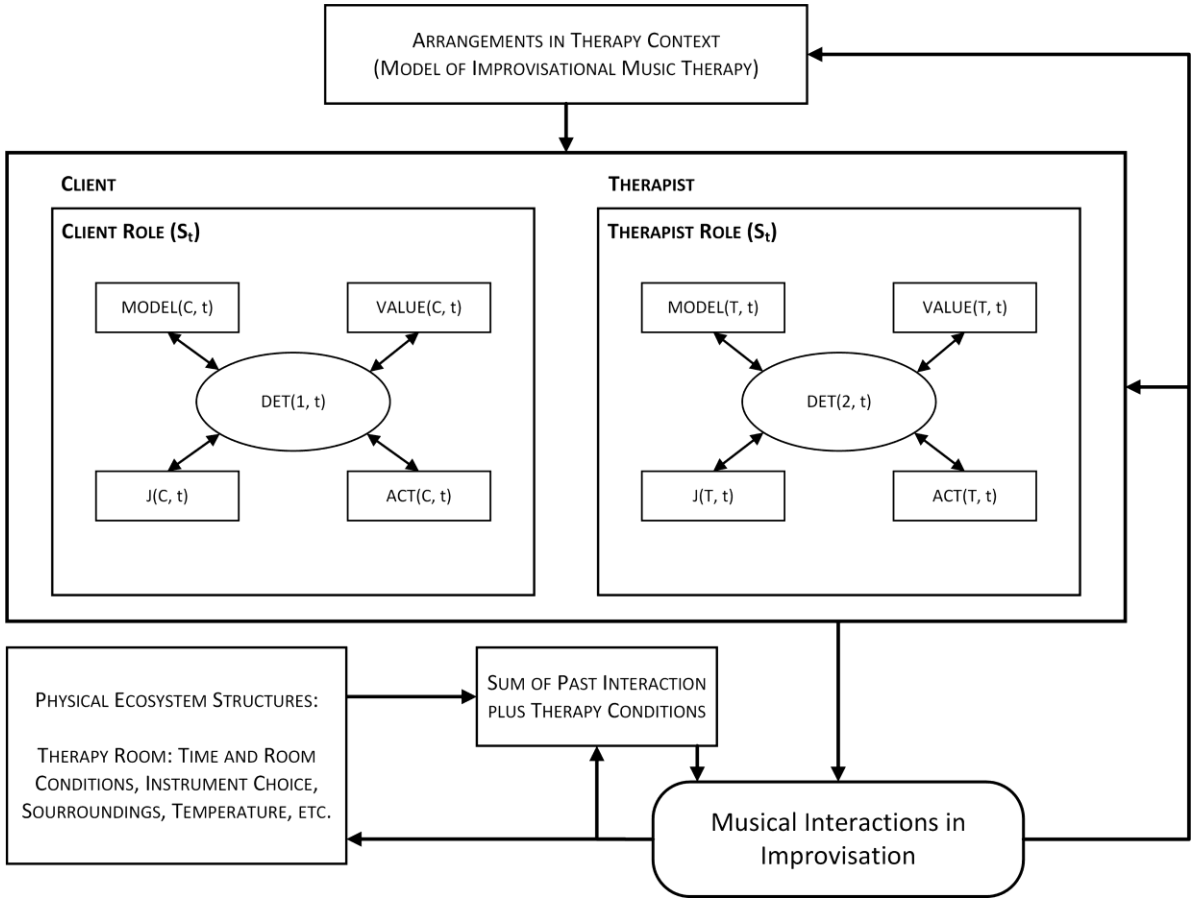
Collaborative Formalisation



Structuring "Musical Interaction"

Sociological Game Theory (SGT) (Burns et al. 2017)

- **sociological development** of **classical game theories**
- conceptualises interaction as **decision-based process**
- **structures and analyses** interaction processes through …
  - … **conditions** surrounding the interaction process
  - … on the base of different **social agents**
  - … who inherit **situationally [t]** changing **[ROLE]**, including
  - … individual **situation understanding [MODEL]**,
  - … individual **values and goals [VALUE]** and
  - … **action possibilities [ACT]**,
  - … compared by a **judgement complex [J]**,
  - … leading to a **final decision making [DET]**



Burns, T. R., Roszkowska, E., Corte, U., & Machado, N. (2017). Sociological Game Theory: Agency, Social Structures and Interaction Processes. Optimum. Studia Ekonomiczne, 5(89), 187–199. https://doi.org/10.15290/ose.2017.05.89.13

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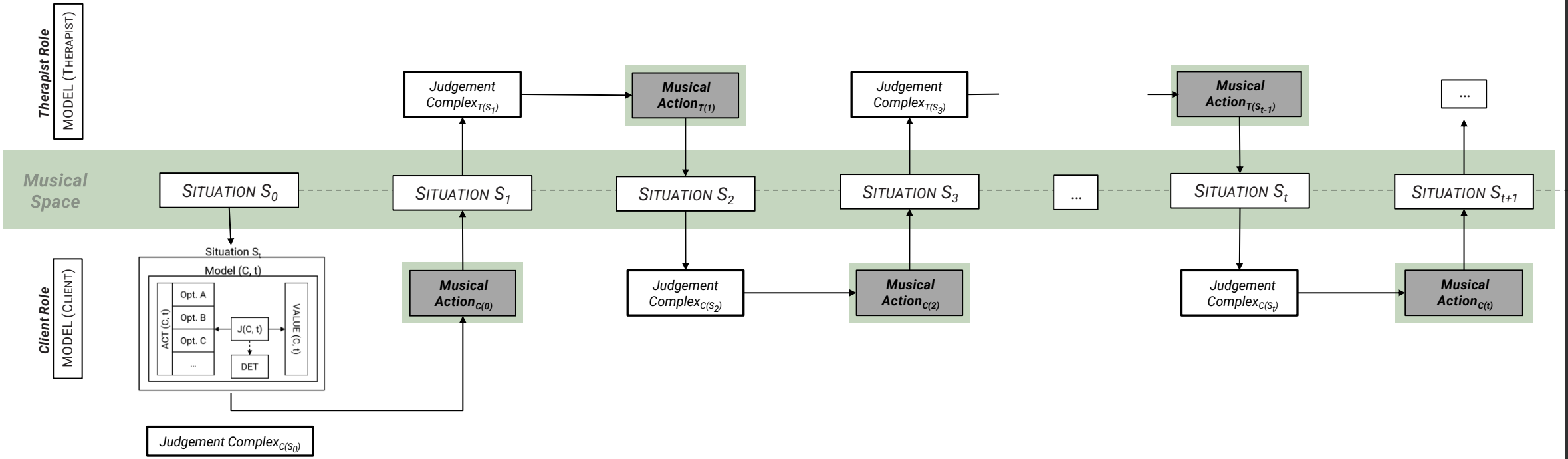

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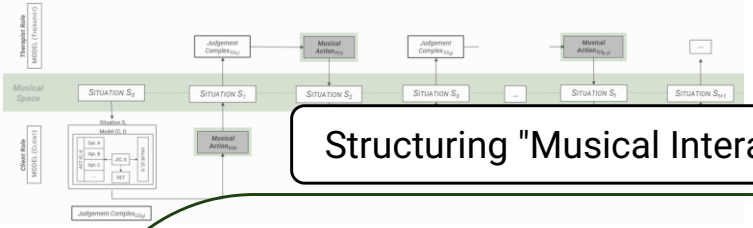

Structuring "Musical Interaction"

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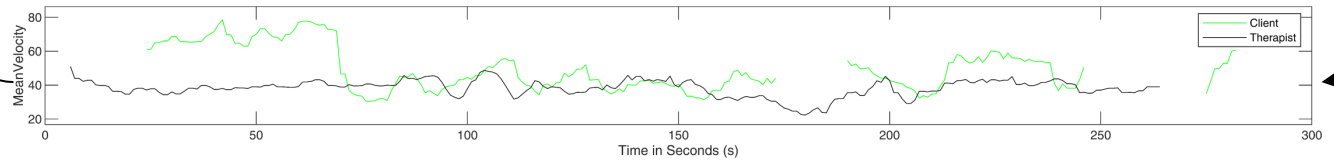


Collaborative Formalisation

DEFINING THE INTERACTION PROFILES / GRADIENTS

PARTNER

"The client assumes leader and follower roles with equal frequency. […]

Musically this includes: ***offering rhythmic and melodic figures as often as grounds, supplying half*** *of the rhythmic and melodic ideas for thematic developments,* ***using*** *volume levels, timbres, and textures that are* ***equally prominent*** *as the partner, and* ***only occasionally more or less prominent, sharing control*** *over the overall volume, tempo, timbre, and texture […].***"** (Bruscia, 1987, p.446)

Bruscia's Profiles Gradients are **relative distributions** of auditory assessed musical behaviour

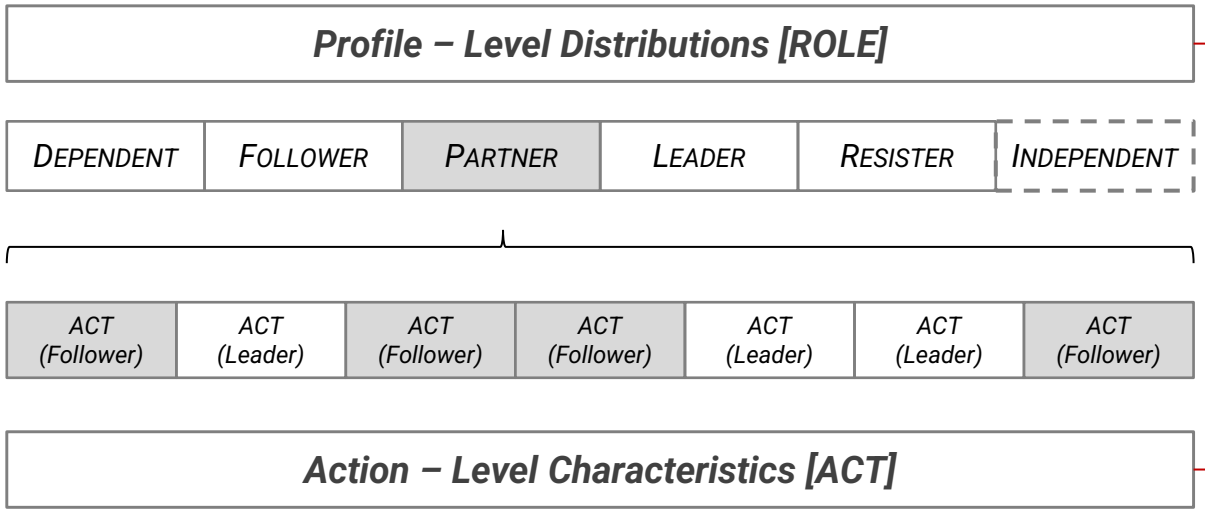
	IAP-Autonomy	**Autonomy Microanalysis**
Analysis Object	**Whole Improvisation** (Distribution)	**Single Musical Action(s)** (Classification)
Analysis Gradients	**Original Bruscia 1987**	**Original Bruscia 1987**

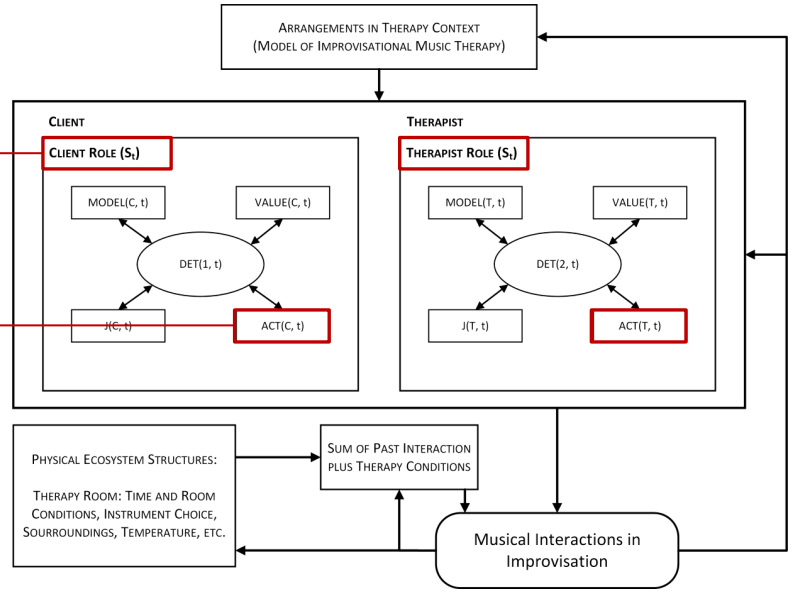
Need for **identification of action-level characteristics relevant to profile assignment**

Collaborative Formalisation

Differentiation between **Profile Level [ROLE]** and **Action Level [ACT]** in accordance with SGT

Microanalytic Reformulation of Bruscia's Descriptions of IAPs





Inductive Analysis of Manual IAP-AM

Bruscia, K. E. (1987). *Improvisational Models of Music Therapy*. C.C. Thomas.

Collaborative Formalisation

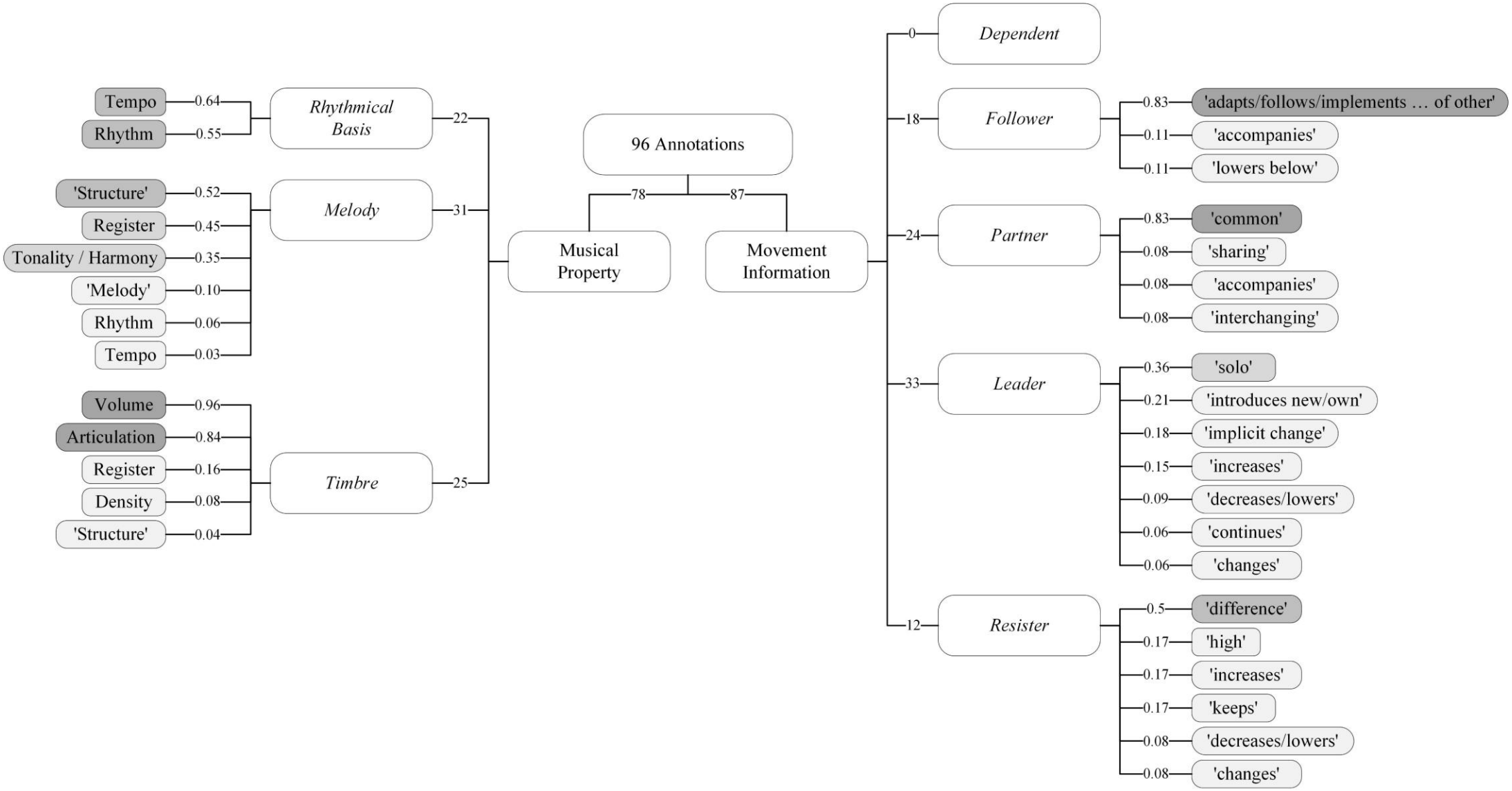
Action – Level Characteristics [ACT]

Time in seconds	5	23	28	38	40	63	69	70	71	75	77	82	84	93	93	94	95	98	99	100	101	103	104
Rhythmical Basis *InterCoder*																							
Dependent																							
Follower										C		C					T	T					
Partner											C/T				C/T					C/T			
Leader	T																						
Resister (active)		C																					
Independent																							
Melody *InterCoder*																							
Dependent																							
Follower		C																					
Partner																							
Leader	T																						
Resister (active)								C															
Independent																							
Timbre *InterCoder*																							
Dependent																							
Follower			C																				
Partner																							
Leader	T																						
Resister (active)		C		C				C															
Independent																							

Time (s)	Actor	Interaction Type	Alt. Type / Description	IAP-AM Cat	Description
5	T	Leader	solo	Rhythmical Basis	*Starting the improvisation with regular rhythmical beat in solo*
5	T	Leader	solo	Melody	**leitet** mit begleitendem gebrochenen Akkord **ein**
5	T	Leader	solo	Timbre	**Begleitmotiv**, **mf**, **deutlicher** Anschlag (schwer-leicht-schwer)
23	C	Follower		Melody	**Folgen** in Tonalität, trotzdem Klient*in in der führenden Melodie; Tonalität kennzeichnender
23	C	Resister		Rhythmical Basis	*playing out of meter*
23	C	Resister		Timbre	f, starker/harter Anschlag
28	C	Follower		Timbre	wird **leiser**, **weicherer** Anschlag
38	C	Resister		Timbre	Anschlag wieder stark, f
70	C	Resister		Melody	Major Chord / Lines vs. minor accompaniment, "roles" stay same
70	C	Resister		Timbre	bitte nochmal hören, wahrscheinlich resister in weich und piano?
75	C	Follower		Rhythmical Basis	***Adapting*** *to meter of Therapist*
77	T	Partner		Rhythmical Basis	*Both on* ***same*** *meter*
77	C	Partner		Rhythmical Basis	*Both on* ***same*** *meter*
82	C	Follower		Rhythmical Basis	**follows** metrum fast
82	T	Follower		Melody	**wechselt** nach Dur
82	C	Follower		Timbre	wird **lauter**, **gleicht** Artikulation **an**
82	T	Leader		Rhythmical Basis	**Begins new** metrum
82	C	Leader	› change (from Resisting	Melody	**Rekontextualisierung** durch Folgen des/der Therapeut*in in Harmonie / Tonalität
82	T	Leader		Timbre	**wird** etwas **lauter**, Artikulation **bleibt**
84	C	Follower		Melody	**begleitet akkordisch** in hohem Register
84	T	Leader		Melody	Trotz Harmonie-Folgen **übernehmen der melodischen Führung**
93	T	Partner		Rhythmical Basis	**Sharing common** rhythm/are **entrained**
93	C	Partner		Rhythmical Basis	**Sharing common** rhythm/are **entrained**
93	C	Partner		Melody	**Teilen** sich Melodiegestaltung
93	T	Partner		Melody	**Teilen** sich Melodiegestaltung
94	C	Partner		Timbre	**Identical** Volume and Articulation
94	T	Partner		Timbre	**Identical** Volume and Articulation
95	T	Follower		Rhythmical Basis	**implements** dotted rhythm
95	C	Leader		Rhythmical Basis	**introduces motive** with dotted note and eigth following
98	C	Partner		Melody	Dreiton Motiv wird **getauscht** (punktiert vs. gerade)
98	T	Partner		Melody	Dreiton Motiv wird **getauscht** (punktiert vs. gerade)
100	T	Partner		Rhythmical Basis	**both** playing dotted rhythm
100	C	Partner		Rhythmical Basis	**both** playing dotted rhythm
100	C	Partner		Timbre	
100	T	Partner		Timbre	
103	C	Follower		Melody	"Begleitet" im Dreitonpattern
103	T	Leader		Melody	**schnellere** Melodielinie außerhalb des Dreitonpatterns

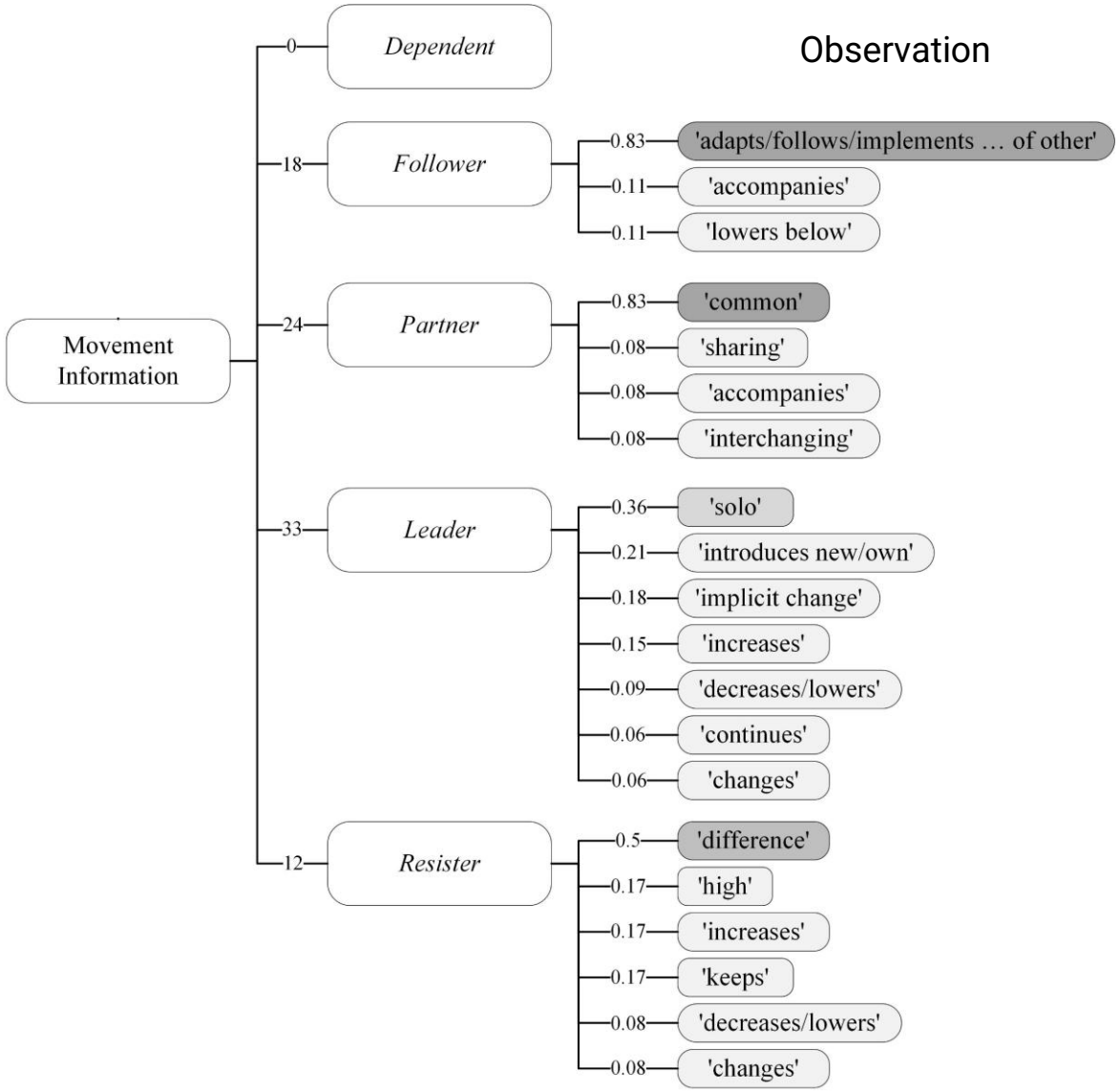
Collaborative Formalisation

Action – Level Characteristics [ACT]



Collaborative Formalisation

Action – Level Characteristics [ACT]



Observation

Inductive Classification

- Special Constellation
- Special Constellation
- Special Constellation
- Higher Level Observation
- Special Constellation
- Absolute Direction
- Absolute Direction
- Continuity
- Change
- Absolute Direction
- Continuity
- Absolute Direction
- Change

Primary Arguments

- Relational Direction
- Proximity
- Proximity
- Proximity/ Relational Direction
- Change in Relational Direction
- Proximity
- Absolute Position (Proximity)

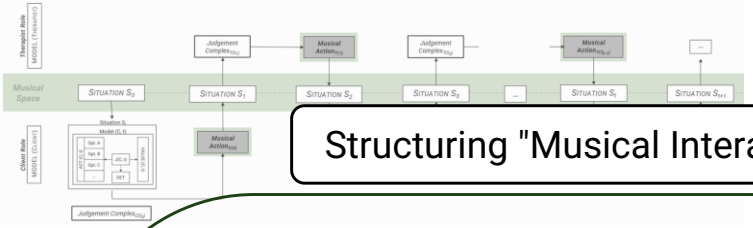
PROXIMITY & RELATIONAL DIRECTION

Collaborative Formalisation

Profile – Level Distributions [ROLE]

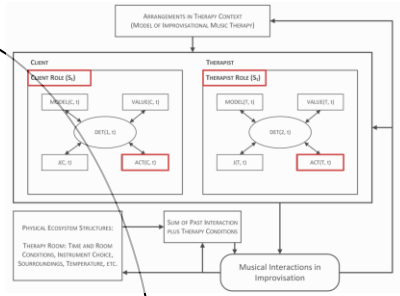
Gradient	Bruscia Descriptions	Formalised Profile
DEPENDENT	*Synchronising, Imitating, Following…*	The player remains in very close ***Proximity (I)*** by *exclusively* ***Affirmative [A]*** behaviour.
FOLLOWER	*Synchronising, Imitating, Matching, …*	The player remains in ***Proximity (I)*** by *predominantly* ***Affirmative [A]*** behaviour.
PARTNER	*Supplying Half, Sharing, Equal, …*	Both players remain in close ***Proximity (I)*** despite *balancing* ***Affirmative (A)*** and ***Contradictive (C)*** behaviour.
LEADER	*Controlling, Supplies, Prominent, …*	The player introduces *change* by ***Contradictive (C)*** behaviour *without losing* ***Proximity (I)***.
RESISTER	*Exclusive Focus and Adherence to own, …*	The player *evades* ***Proximity*** by ***contradictive (C)*** or ***neutral (0)*** behaviour in ***high difference (II)*** to the other player.

Main Challenge



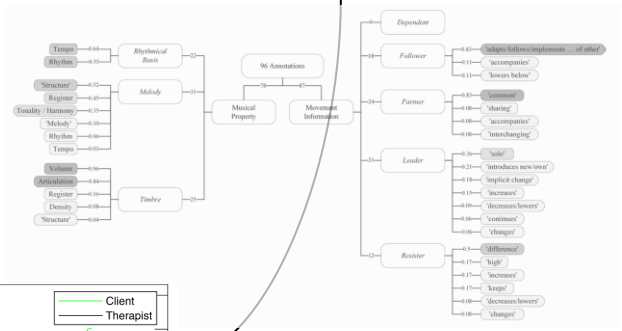
Structuring "Musical Interaction"

DEPENDENT | FOLLOWER | PARTNER | LEADER | RESISTER | INDEPENDENT

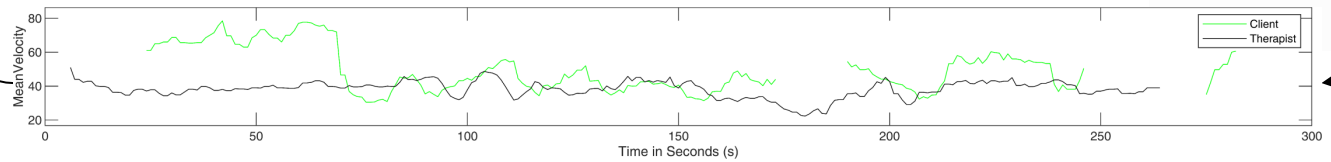


Gap

Collaborative Formalisation



Supervised Machine Learning



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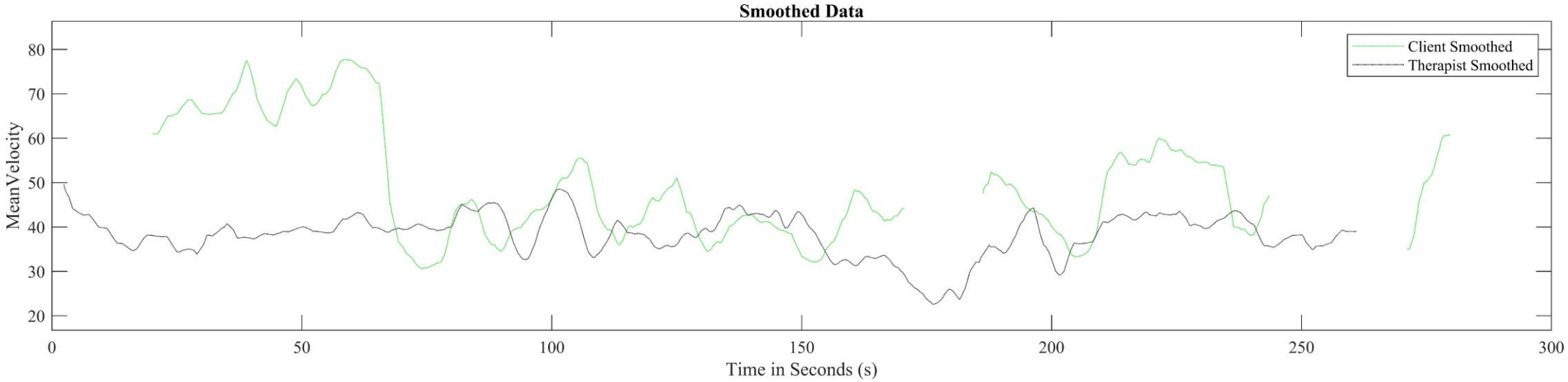

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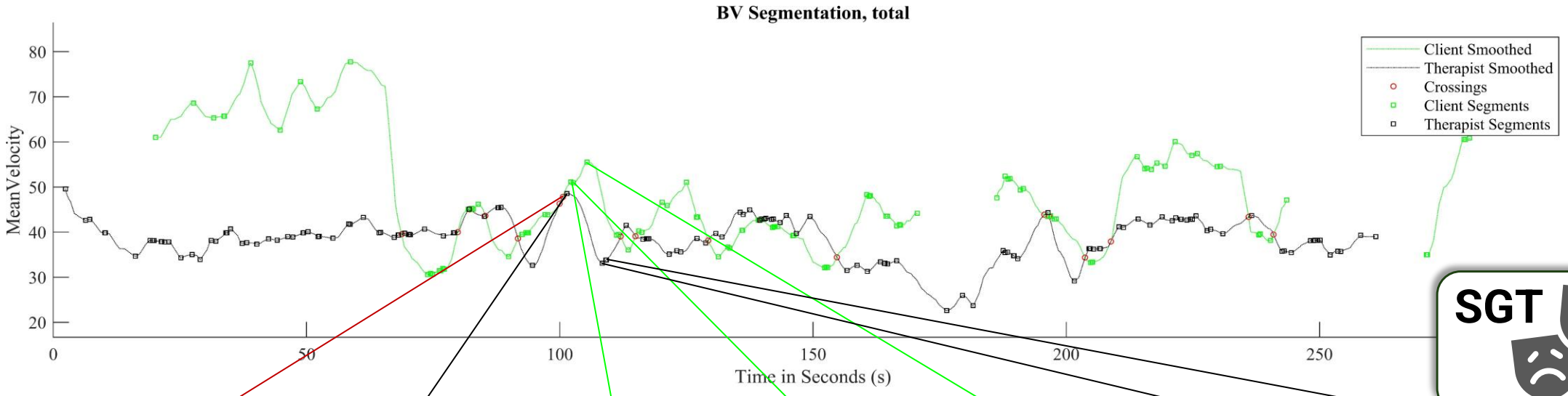

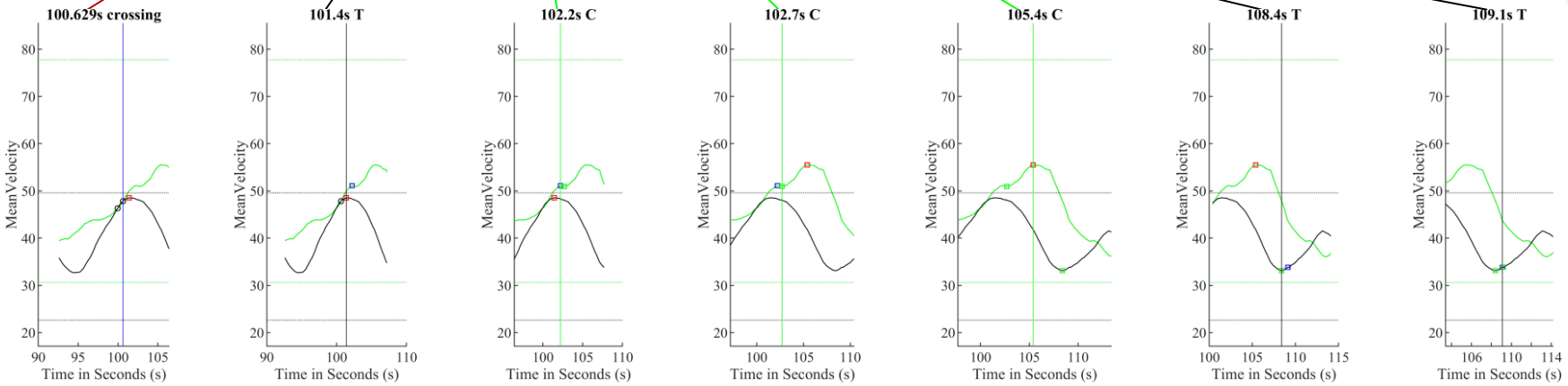

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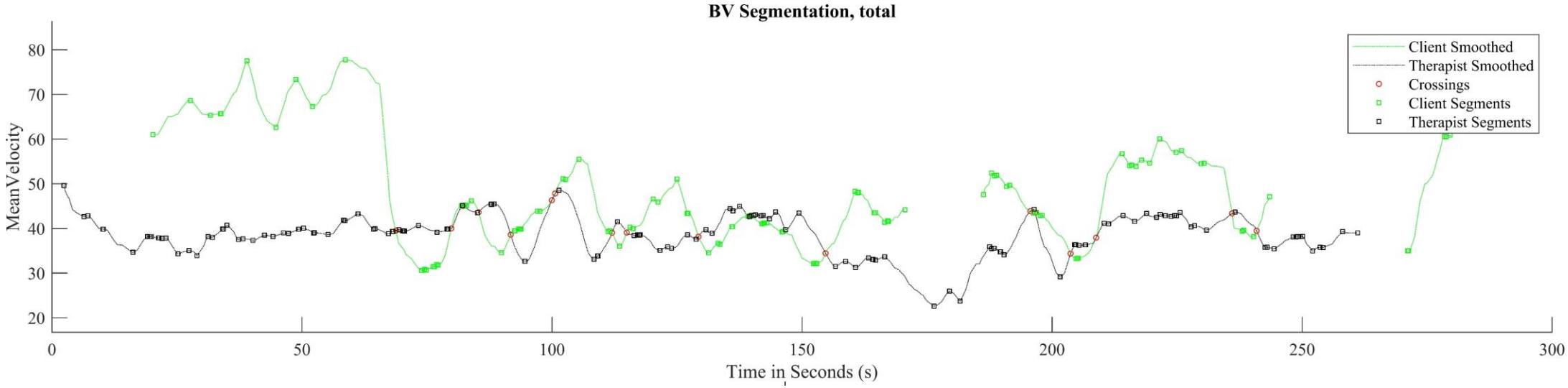
100,6290174		crossing			0,770982553	47,81822773	-0,028733231	47,81822773	0,042370182	0	0,027078325
101,4	max	act	T	3,8	0,8	50,02857143	-0,028733231	48,53594322	-0,040015228	0,027078325	0,02391831
102,2	max	act	C	0,8	0,5	51,11904762	0	48,30797952	-0,040015228	0,050996635	0,002023461
102,7	min	act	C	1,3	2,7	50,94404762	-0,030641563	48,02144106	-0,040015228	0,053020096	0,195206473
105,4	max	act	C	4	3	55,50446429	0,050591216	41,82156566	-0,040015228	0,24822657	0,020048704
108,4	min	act	T	3	0,7	47,88376984	0,050591216	33,09573413	0,019311204	0,268275274	-0,089674175
109,1	max	act	T	3,7	0,1	43,68583333	0,050591216	33,84087302	0	0,178601099	-0,004270782

Supervised Machine Learning



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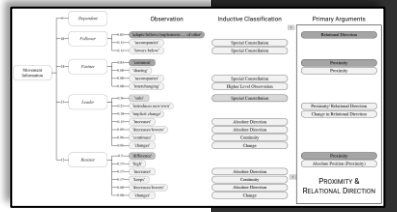
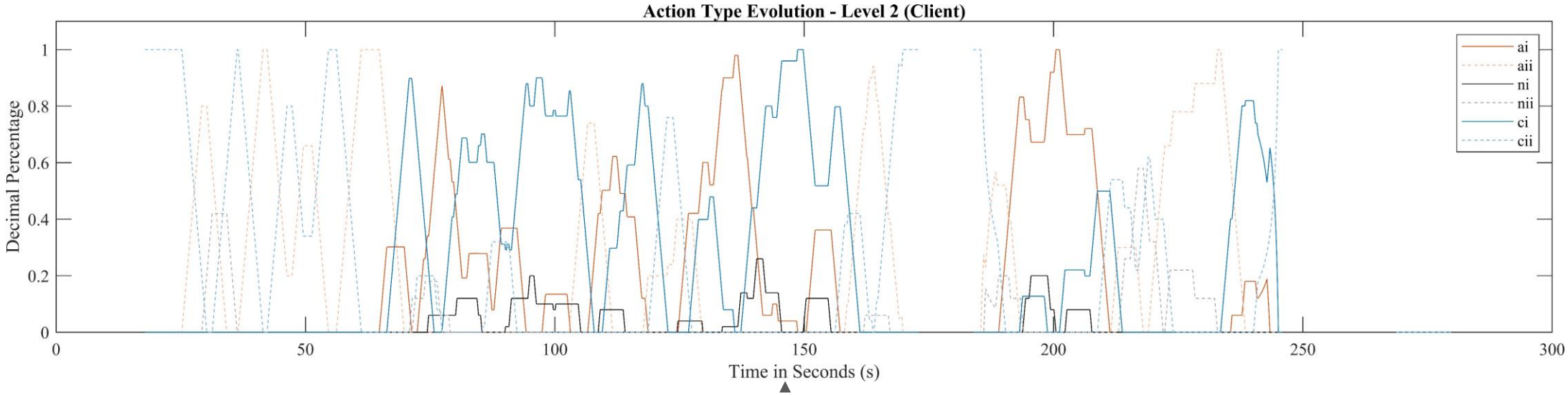
102,2	max	act	C	0,8	0,5	51,11904762	0	48,30797952	-0,040015228	0,050996635	0,002023461
102,7	min	act	C	1,3	2,7	50,94404762	-0,030641563	48,02144106	-0,040015228	0,053020096	0,195206473
105,4	max	act	C	4	3	55,50446429	0,050591216	41,82156566	-0,040015228	0,24822657	0,020048704
108,4	min	act	T	3	0,7	47,88376984	0,050591216	33,09573413	0,019311204	0,268275274	-0,089674175
109,1	max	act	T	3,7	0,1	43,68583333	0,050591216	33,84087302	0	0,178601099	-0,004270782



Supervised Machine Learning Classifier

Relation (Actor 1)	*Proximity*	*Relation (Actor 2)*
A (Affirmative) N (Neutral) C (Contradictive)	I / II	A / N / C

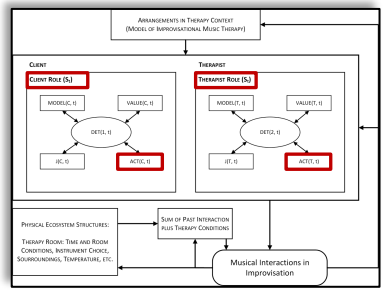
Supervised Machine Learning



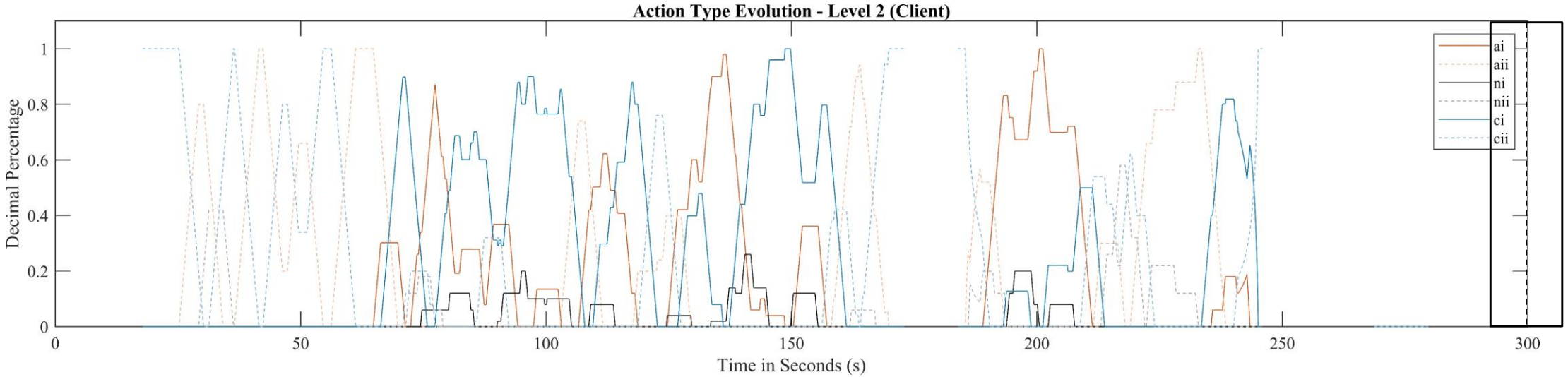
Supervised Machine Learning Classifier

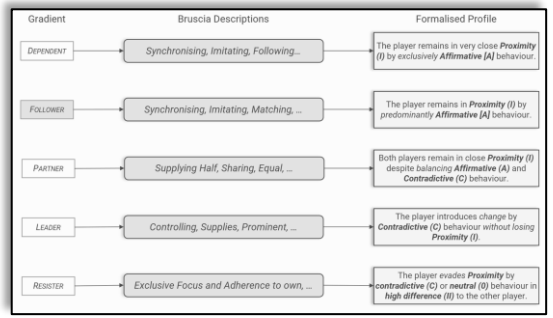
Relation (Actor 1)	*Proximity*	*Relation (Actor 2)*
A (Affirmative) N (Neutral) C (Contradictive)	I / II	A / N / C

time	segtype	type	actor	fromother	tonext	cvalue	crelintensity	tvalue	trelintensity	featdeltapercent	featdeltapercentdiff
100,6290174		crossing			0,770982553	47,81822773	-0,028733231	47,81822773	0,042370182	0	0,027078325
101,4	max	act	T	3,8	0,8	50,02857143	-0,028733231	48,53594322	-0,040015228	0,027078325	0,02391831
102,2	max	act	C	0,8	0,5	51,11904762	0	48,30797952	-0,040015228	0,050996635	0,002023461
102,7	min	act	C	1,3	2,7	50,94404762	-0,030641563	48,02144106	-0,040015228	0,053020096	0,195206473
105,4	max	act	C	4	3	55,50446429	0,050591216	41,82156566	-0,040015228	0,24822657	0,020048704
108,4	min	act	T	3	0,7	47,88376984	0,050591216	33,09573413	0,019311204	0,268275274	-0,089674175
109,1	max	act	T	3,7	0,1	43,68583333	0,050591216	33,84087302	0	0,178601099	-0,004270782



Supervised Machine Learning





Supervised Machine Learning

Interaction Distribution

Actors prominent Action Type

A > N | C

N > A | C

C > A | N

Prevalence of Proximity

A.II > A.I

Follower (Approaching)

A.I > A.II

Difference to C.I

|A.I-C.I| <= 0.3

Partner (Subordinate)

|A.I-C.I| > 0.3

Prominence of A.I

A.I >= 0.95

Dependent

A.I < 0.95

Follower (Close)

Prevalence of Proximity

N.II > N.I

N.II > N.I

Other Prominent Act Type

A

N

C

Resister (Passive)

Resister (Passive)

Resister (Passive)

Other Prominent Act Type

A

N

C

Neutral

Partner (Neutral)

Neutral

Prevalence of Proximity

C.II > C.I

Resister (Active)

C.I > C.II

Difference to A.I

|C.I-A.I| <= 0.3

Partner (Superior)

|C.I-A.I| > 0.3

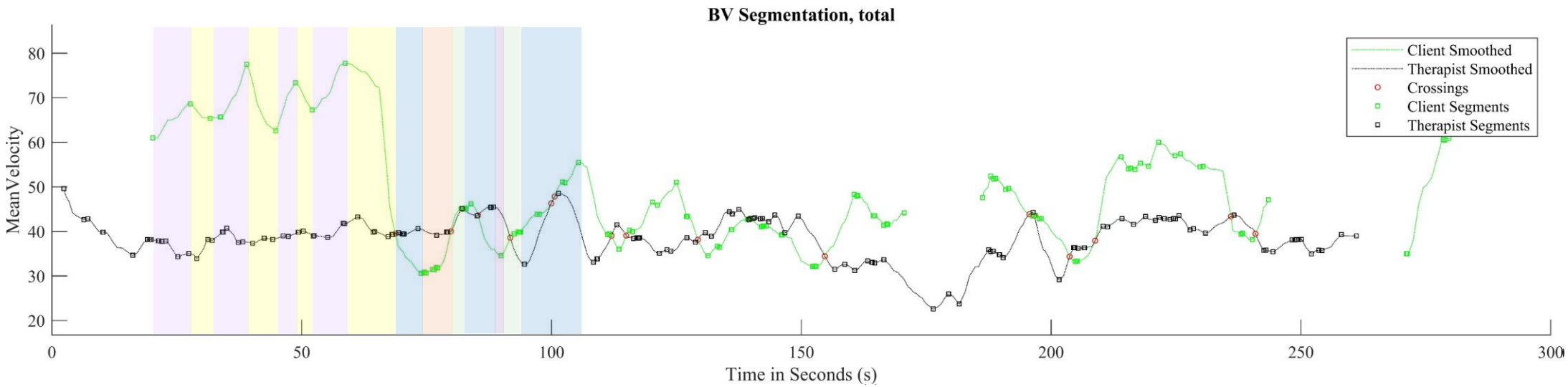
Leader

Supervised Machine Learning

PARTNER

RESISTER

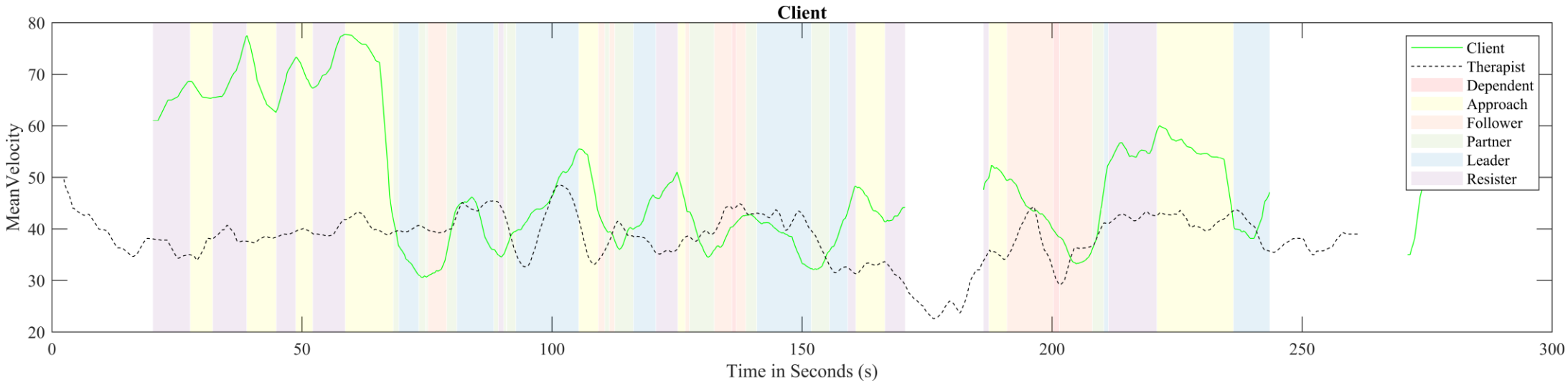
FOLLOWER (CLOSE)



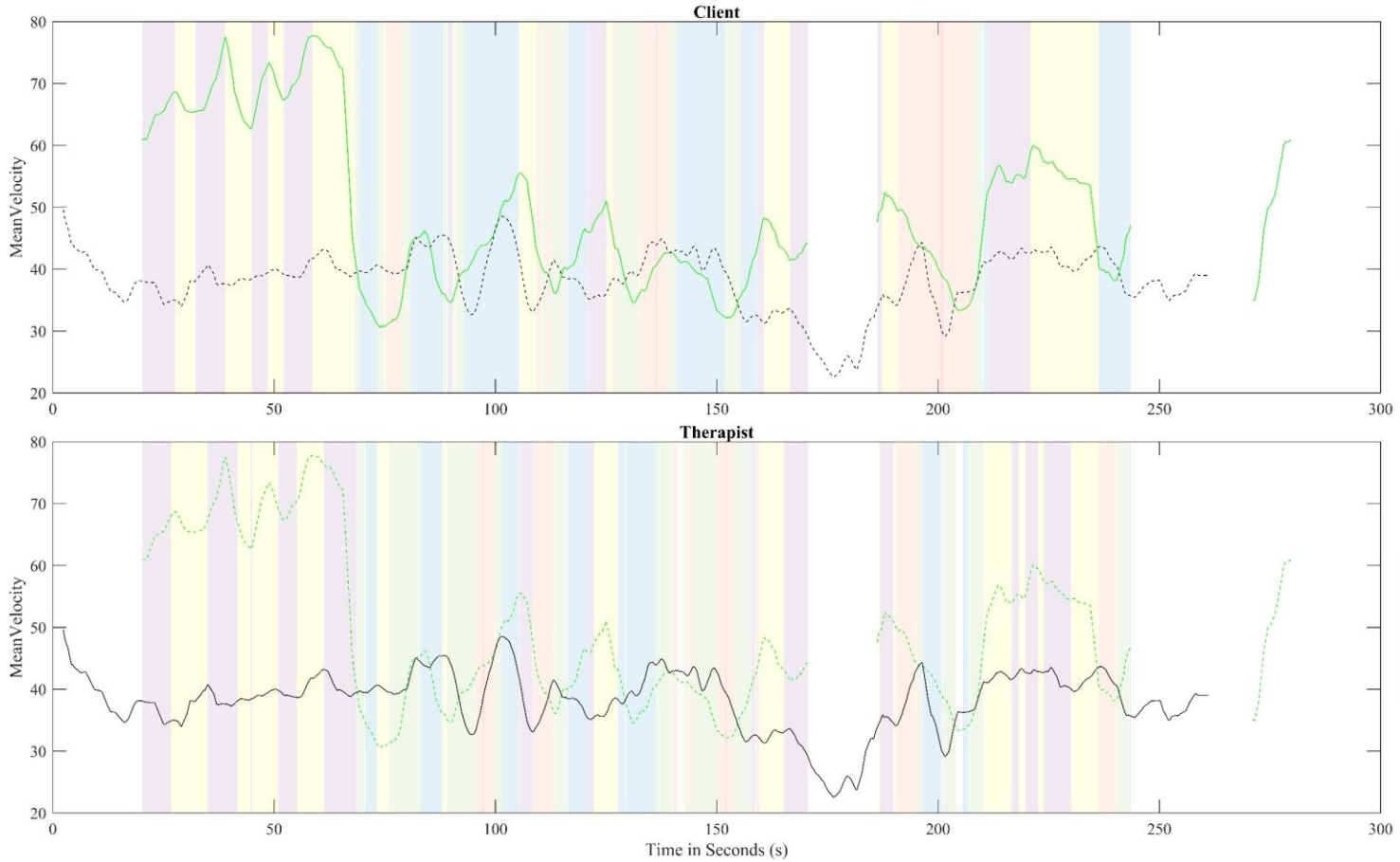
FOLLOWER (APPROACHING)

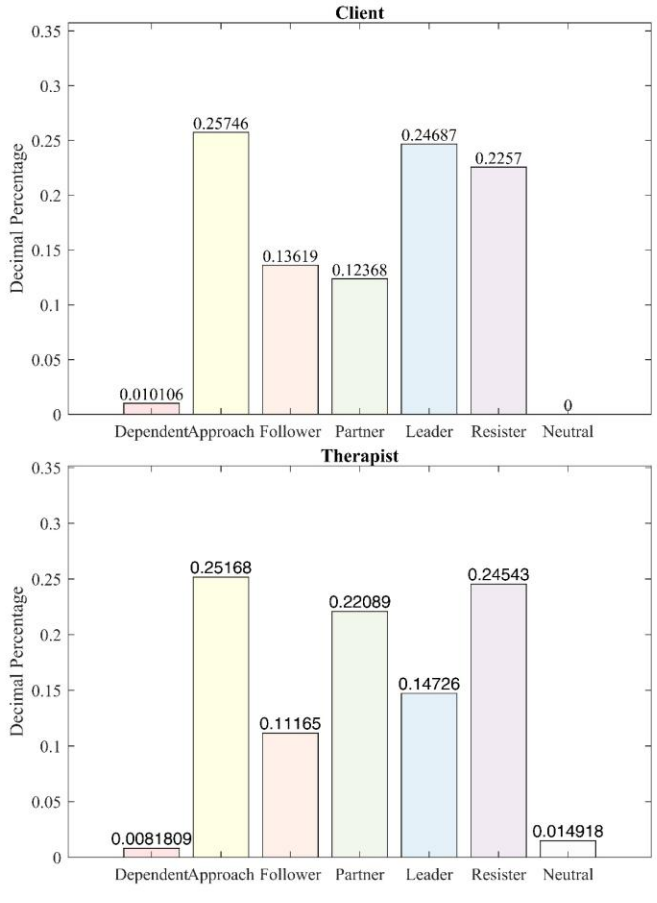
LEADER

Supervised Machine Learning



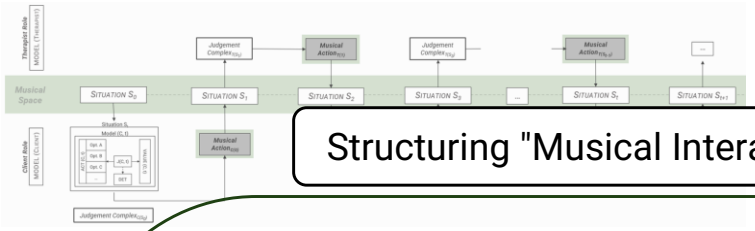
Supervised Machine Learning



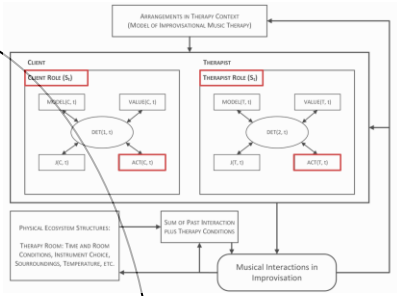


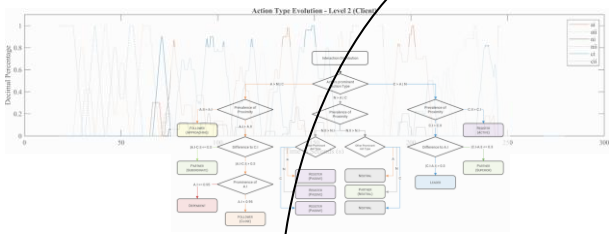
Main Challenge

Structuring "Musical Interaction"



DEPENDENT | FOLLOWER | PARTNER | LEADER | RESISTER | INDEPENDENT

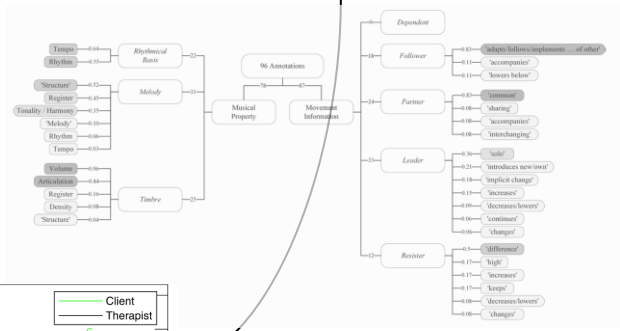


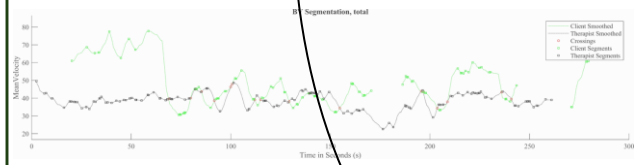


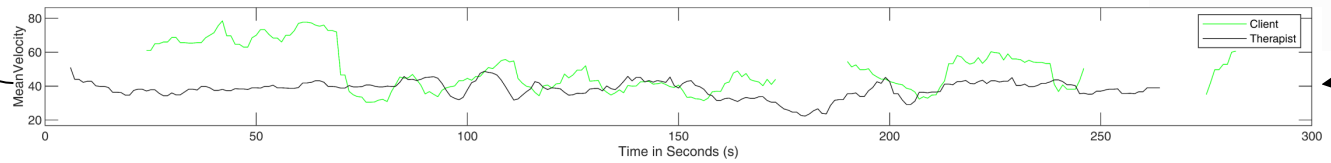
Gap

Supervised Machine Learning

Collaborative Formalisation







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KI~LABOR

Thank you!

More information:

Vobig, B. (2025). A Computational Approach to Interaction Type Analysis of Music Therapy Improvisations. *Music & Science*, *8*. https://doi.org/10.1177/20592043251329233

https://ifas.thws.de/en/high-m/

Paper on CAMII in Submission Process, Paper on Statistical Results to be submitted until October 2025

BayWISS-Kolleg
Gesundheit

a.r.u. Cambridge Institute for Music Therapy Research

UNIVERSITY OF JYVÄSKYLÄ

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Agenda Bavaria