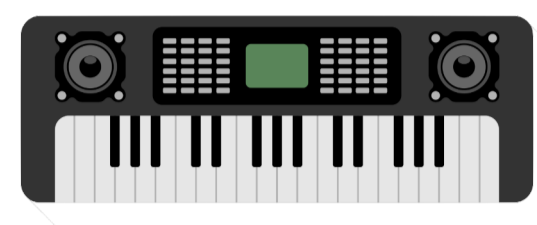


Timbre is among the most evocative yet elusive attributes of music



absent from the digital luthier's toolbox



Our long term goal

Investigate the role of timbre in the design of sound synthesis and artificial intelligence tools that enable makers to create digital interactions with an understanding of how we listen

NIME

NIME 2001-2022
1969 papers

ISMIR

ISMIR 2000-2022
2245 papers



Research questions

- ➔ How much is the term "timbre" used in each community
- ➔ What is the intention for timbre within each community?
- ➔ What notion of timbre (e.g. acoustical, semantic, embodied) does each community operationalise?

Methodology box



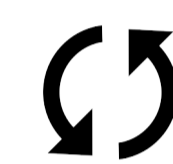
STEP 1

Keyword search through each year for the term "timbre"

TIMBRE?

STEP 2

Years were grouped across periods reflecting the typical cycles of research projects. NIME was grouped for 4 years, ISMIR for 2.



Research Cycles

STEP 3

Concordance: looking for co-occurrences within five words to the left-right, identifying looser word associations than the n-gram approach.

Collocation: initially determined by maximum likelihood with Bonferroni adjustments, results were then filtered manually.

Table 1: Usage of terms in NIME proceedings between 2001 and 2022

Period	Papers		Timbre		Pitch		Gesture	
	#	#	%	#	%	#	%	
2001-04	163	60	36.81%	100	61.35%	103	63.19%	
2005-07	251	81	32.27%	136	54.18%	158	62.95%	
2008-10	286	76	26.57%	154	53.85%	177	61.89%	
2011-13	377	132	35.01%	208	55.17%	245	64.99%	
2014-16	338	115	34.02%	203	60.06%	209	61.83%	
2017-19	285	98	34.39%	166	58.25%	187	65.61%	
2020-22	269	94	34.94%	170	63.20%	168	62.45%	
Total	1969	656	33.32%	1137	57.75%	1247	63.33%	
Mean/year	89.5	29.8	33.74%	51.7	58.13%	56.7	63.26%	

Table 2: Usage of terms in ISMIR proceedings between 2000 and 2022

Period	Papers		Timbre		Pitch		Genre	
	#	#	%	#	%	#	%	
2000-01	76	13	17.11%	51	67.11%	21	27.63%	
2002-04	210	48	22.86%	132	62.86%	103	49.05%	
2005-07	317	104	32.81%	168	53.00%	185	58.36%	
2008-10	339	131	38.64%	203	59.88%	211	62.24%	
2011-13	331	121	36.56%	214	64.65%	191	57.70%	
2014-16	332	112	33.73%	214	64.46%	185	55.72%	
2017-19	308	107	34.74%	239	77.60%	164	53.25%	
2020-22	332	116	34.94%	229	68.98%	197	59.34%	
Total	2245	752	33.50%	1450	64.59%	1257	55.99%	
Mean/year	97.6	32.7	33.44%	63.0	64.66%	54.7	56.42%	

Table 3: Terms collocated with "timbre" in analysed NIME papers (brackets report the number of papers that contain the collocate)

2001-04	2005-07	2011-13	2014-16	2017-19	2020-22
control (17)	control (18)	control (27)	control (23)	control (23)	control (14)
space (11)	space (10)	changes (19)	changes (22)	variation (8)	changes (9)
variation (3)	variation (8)	variations (6)	space (15)	space (8)	space (8)
features (2)	articulation (7)	voice (6)	features (7)	variety (5)	articulation (4)
descriptors (1)	changes (6)	similarity (4)	navigation (6)	manipulation (5)	transpositions (2)
	modulation (5)	affect (4)	recognition (5)	feature (4)	descriptors (2)
2008-10	gestural (4)	remapping (3)	description (3)	articulation (4)	explorer (1)
control (12)	recognition (3)		morphology (3)	learned (3)	bowing (1)
changes (8)	words (2)		morphing (2)	preserving (2)	
space (4)	classification (2)		attributes (2)	performative (1)	
nuances (3)	vocalic (1)		matching (2)	phrasing (1)	
voice (2)			semantic (1)		
remapping (1)			spatialization (1)		
deviations (1)			visualization (1)		
plucking (1)			unintended (1)		

Table 4: Terms collocated with "timbre" in analysed ISMIR papers (brackets report the number of papers that contain the collocate)

2000-01	2002-04	2011-13	2014-16	2017-19	2020-22
modelling (2)	similarity (8)	features (43)	features (45)	features (25)	features (28)
instrument (2)	features (8)	modelling (12)	similarity (18)	instrument (15)	transfer (16)
	space (4)	descriptors (9)	invariant (9)	changes (9)	instrument (15)
	instrument (4)	changes (9)	descriptors (8)	learned (8)	synthesis (14)
		instrument (8)	electronic (5)	space (8)	disentangled (12)
		invariant (6)	variations (5)	synthesis (7)	space (10)
2005-07	2008-10	verbal; descr. (6)	MFCC (5)	representations (7)	changes (8)
similarity (30)	features (44)	instrumentation (6)	vocal (3)	invariant (6)	control (8)
features (27)	similarity (28)	articulation (5)	variability (3)	regularized (4)	similarity (8)
instrument (14)	changes (11)	space (5)	shape (3)	variational (4)	MFCC (6)
modelling (14)	instrument (10)	robustness (5)	stability (2)	disentangled (2)	variational (6)
recognition (8)	modelling (7)	vocal (4)	syllables (2)	transfer (2)	variations (6)
polyphonic (7)	space (7)	distance (2)	shifts (2)	discrimination (1)	descriptors (5)
gestures (5)	game (2)		attributes (1)		regularized (5)
attributes (5)	streaming (1)				articulation (4)
articulation (4)	metrics (1)				semantic (4)
singing (2)	varieties (1)				translation (3)
inference (1)					overtones (3)
classifiers (1)					encoder (2)

Perspectives box

There is still limited timbre-based practice in the digital music making creative workflow



Limited practice



Analytical concepts

Current design practices in DMI and MIR systems encode assumptions about musical space that are primarily based on analytical concepts from music theory, such as the idea that music is made by discrete onset and release events

Timbre matters! Converging recent musicological theories posit that timbre in contemporary music making and listening practices is as or even more important than pitch-based concepts like melody and harmony. Musical interaction and timbre perception are intimately linked

