

V Congresso da TeMA (Associação Brasileira de Teoria e Análise Musical)

**Notating and analyzing the context, sounds, and images of an
improvised DMI (digital musical instrument) performance:
“Everyone to the Power of One” for T-Stick, by D. Andrew Stewart**

“New horizons demands new descriptions...”

(composer, conductor, and teacher Theodor Antoniou; in Cage’s “Notations”, 1969, p.260)

“Everything from a siren to a set of tuned sheep-bells...”

(composer, playwright, pianist, and teacher James Drew; in Cage’s “Notations”, 1969, p.261)

Eixo temático específico 3: O impacto da tecnologia na teoria e análise musical

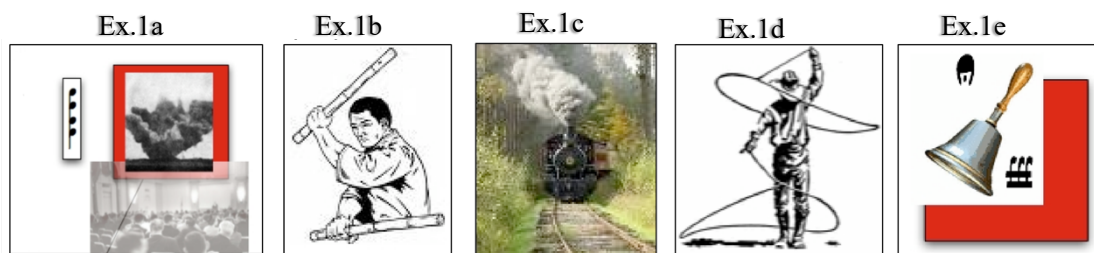
Keywords: Improvisação em DMI. Análise de performance de DMI. Notação musical. T-Stick. D. Andrew Stewart.

Abstract:

The motivation for this case study is the need to develop notational and analytical tools to transcribe and understand performances of DMIs (digital music instruments) recorded in audio and/or video. Moreover, there is the need to communicate analysis to larger audiences, constituted not only by music-tech musicians but also acoustical musicians (commonly distanced from the technological and quantitative aspects of sound) and the so-called “non-muso” musicians (commonly distanced from the traditional notation of music; Tagg, 2011). Our primary source is the improvisational performance of “Everyone to the Power of One”, a work for solo T-Stick, by a specialist on this instrument, composer-performer D. Andrew Stewart (2010, p.22) in a video recording from 2008, lasting 9 minutes and 14 seconds. The T-Stick is a DMI developed 20 + years ago by Joseph Malloch in his Master’s (2008) and Ph.D.(2013)

Differently from most DMIs created in academic environments, the T-Stick endured over two decades of existence due to its simplicity of construction, low cost, versatility of sensors, and easy maintenance. Also distinctive of the T-Stick is its very simple nature, basically an ABS tube with internal and external sensors activated by limb gestures in space, what gives it inherent theatrical possibilities on stage (Stewart & Malloch, 2010, p.3094-3096).

A review of referential literature about music notation from *musique concrète* onwards (Shaeffer, 1966; Cage, 1969; Smalley, 1997; Thoresen, 2004; Sauer, 2009; Magnusson, 2019) shows that the advent of sound recording with magnetic means in 1945, and digital means in 1975, greatly expanded the sonic world of music and, therefore, its notation. In the repertory he composed for the T-Stick, D. Andrew Stewart exhibits a notational style that follows the main trends of post-World War II music scores as it keeps up with tradition, but assimilates the transgressive, poetic, and imagistic influence of the other arts, such as photography, drawings, collage, poetry, and even dance (Ex.1).

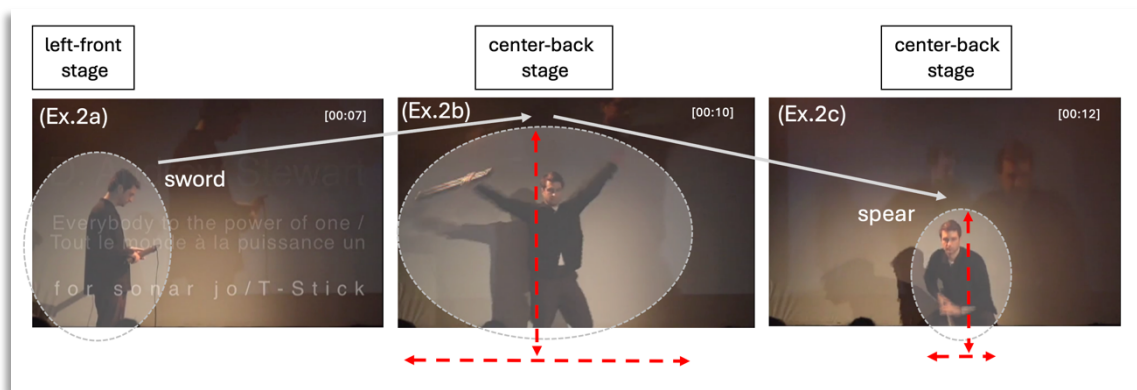


Ex.1 – Contextual images from the prompt score of “Everyone to the Power of One” by Stewart: (Ex.1a) explosion and audience, (Ex.1b) oriental martial-art fighter with bamboo sticks, (Ex.1c) steam locomotive, (Ex.1d) cowboy’s *lasso*, and (Ex.1e) handbell with *fff* and *fermata*.

At a first sight, Thorsen’s meticulous spectro-morphological notation, which includes qualitative and quantitative data, seemed to be the most appropriate for the transcription of a multi-layer timber-complex DMI piece such as “Everyone to the power of one”. However, the steep-learning curve for even professional musicians¹ to familiarize with its abstract symbols, signs and icons pointed to a different solution, which combines traditional and post-World War II notational strategies, approached with

To discuss musical events from local to large levels, we borrowed the analytical concepts of foreground, middle-ground and background from Schenker (Forte and Gilbert, 1982). The first steps of the analysis process involved the recognition of elements and the timing of their occurrences. The complex interaction of sounds and images called for initial sketches focused on a few categories of events, generating different timelines: one for phrasing formed by punctual events and their sound envelopes, one to annotate pitches and timbers described qualitatively, and one for metaphorical gestures and structural trigger points. The superimposition of imagistic, sounding and textual/contextual contents revealed either the reinforcement or contradiction of explicit and subliminal meanings. Ex.2 and Ex.3 show, in foreground levels, the theatrical possibilities of the T-Stick explored on stage by the performer, which gestures, although may vary on each performance, seem not to be improvised, but results of honed motor skills and deliberate practice, which can be learned and taught (Lavastre & Wanderley, 2024, p.143, 149-150).

¹ Smalley notices that “Although the detail of spectro-morphological description may sometimes not be easy to follow, particularly without an extensive experience of electroacoustic music repertory, it is far from being an esoteric activity” (1997, p.125).



Ex.2 - D. A. Stewart's kinesphere with the T-Stick on stage in "Everyone to the Power of One": moving from left to right (Ex.2a), expanding with a "sword" (Ex.2b) and contracting with a "spear" (Ex.2c).



Ex.3 - The T-Stick used as martial-art cold-arm props in "Everyone to the Power of One": a "spear" (Ex.3a), a "sword" (Ex.3b), and a "shield" (Ex.3c).

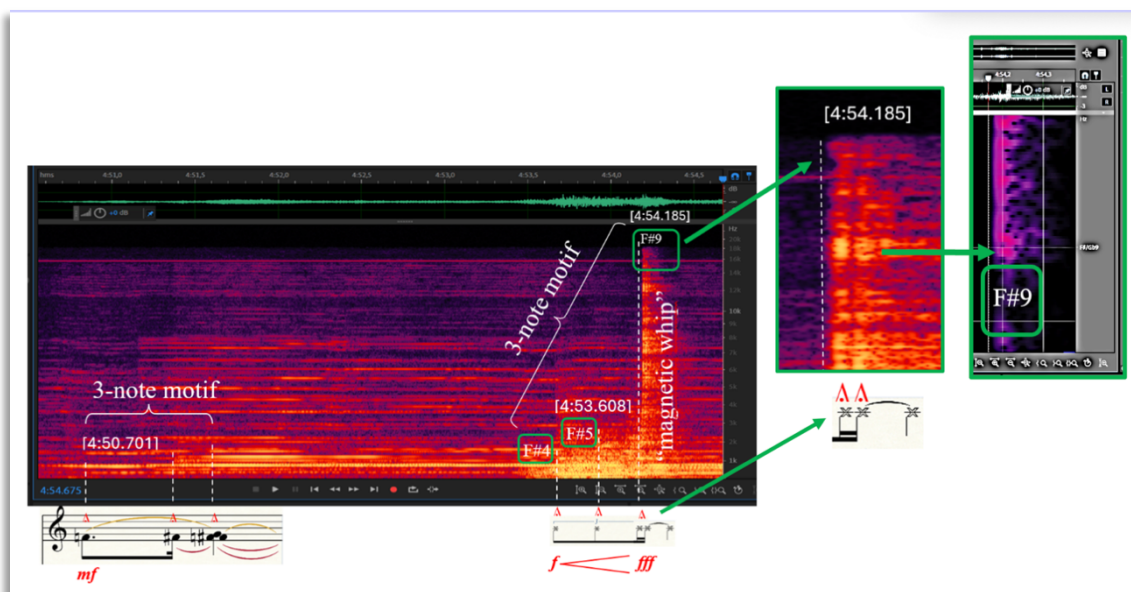
Ex.4 shows the collection of most relevant sounds from Stewart's mapping² for the T-Stick used in the video performance, selected on the basis of articulation (*legato* or *staccato*), dynamics (with maximum and minimum values in dB), formal structural relevance (in the *A*, *B* and *A'B'* Sections), and labeling with non-muso descriptions.

² "Mapping in the context of DMI design is the process by which control signals from sensors or gestures are associated with parameters of a sound synthesizer or other output medium". (Stewart & Malloch, 2010, p.3094).

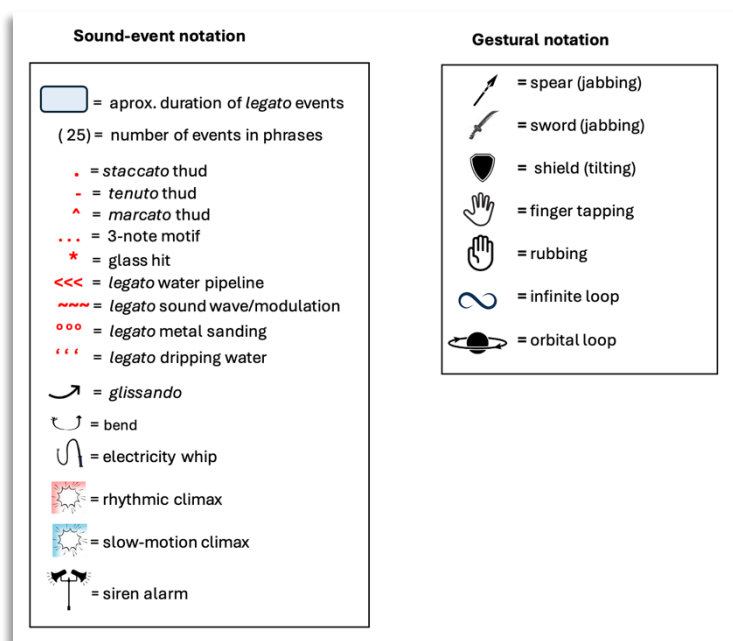
intensity / articulation	<i>Section A</i>			<i>Section B</i>			<i>Section A'B'</i>		
maximum intensity in <i>staccato</i>	[0:19.665]	[1:04.896]	[1:52.464]	-----	[3:36.035]	[4:54.208]	[5:46.997]	[6:51.462]	[7:28.485]
	-7,2 dB	-7,1 dB	-7,3 dB		-9,7 dB	-6,5 dB	-6,5 dB	-7,0 dB	-7,5 dB
	3rd non-pitched note of the 3-note motif	F5 "breaking glass"	low non-pitched "thud"		non-pitched "slap bass"	F# "magnetic whip"	Es "bell"	appoggiatura B4-C5 with "wood strike"	F5 "thud"
maximum intensity in <i>legato</i>	[0:20.327]	[1:13.244]	[1:20.142]	[3:44.870]	[3:33.37]	[4:17.030]	[5:28.247]	[6:40.095]	[7:30.797]
	-14,0 dB	-10,0 dB	-11,0 dB	-9,6 dB	-9,1 dB	-11,0 dB	-17,0 dB	-13,5 dB	-7,0 dB
	non-pitched "airy pipeline"	B4 bend (wave/frequency modulation?)	G5 bend + "metal sanding"	G3 "airy pipeline"	D5 "airy pipeline" + "metal sanding"	reverb of E4 "bell" + "gong"	G5 "airy pipeline" + "dripping water"	F4-Ab4 bichord "alarm siren"	rotating "metal sanding"
minimum intensity in <i>staccato</i>	[1:04.469]	[1:39.459]	[2:12.034]	[3:16.870]	-----	[4:40.337]	[5:09.494]	[5:21.899]	[7:09.865]
	-21,0 dB	-20,0 dB	-26,0 dB	-22,0 dB		-21,5 dB	-26,0 dB	-22,0 dB	-29,0 dB
	F4 "thud"	non-pitched "thud"	Eb4 "thud echo"	chromatic (E4, F4, F#4, G4) "airy pipeline"		"thud" + F#5	C4 muted "thud"	C#4 "thud"	chromatic (Ab5-G5) "eerie vocal"
minimum intensity in <i>legato</i>	[0:24.318]	[2:03.336]	[2:14.683]	[2:53.227]	[3:11.137]	[4:37.101]	[5:03.021]	[6:35.655]	[6:32.891]
	-30,0 dB	-32,0 dB	-36,8 dB	-35,0 dB	-39,0 dB	-51,0 dB	-54,5 dB	-48,0 dB	-66,5 dB
	"airy pipeline" + "dripping water"	Bb4 to A4 "airy pipeline" to "lightsaber" + "metal sanding"	non-pitched "airy pipeline" + "dripping water"	descending major triad (G4-E4-C4) "airy pipeline"	C4 to B4 <i>glissando</i> "airy pipeline"	F#5 "metal sanding"	F5-E5-F5 "airy pipeline" bend + "metal sanding"	<i>ppp</i> non-pitched "hiss"	"cranking gear" <i>molto crescendo</i>
dynamics	Min = -36,8 dB Max = -7,1 dB			Min = -51,0 dB Max = -6,5 dB			Min = -65,6 dB Max = -6,5 dB		

Ex.4 - Table with the structural sound collection from Stewart's mapping for the T-Stick used in *Sections A, B, and A'B'* of "Everyone to the power of one" with articulation, dynamics and timing.

Ex.5 shows two transformed recurrences of the 3-note motif in *Section A'B'* of "Everyone to the power of one". First, there is an accumulation of sounds that result in a two-semitone cluster (F5, F#5 and G5). Then, it follows a climatic arpeggiation of the pitch F#, encompassing 5 octaves (F#4, F#5 and F#9) within a very distinctive *crescendo*. A spectrographic zoom of this event, which surpasses the common pitch range of musical events, shows two very close attacks in the last note of the motif, a feature also observed in the first appearance of this motif in the very beginning of the video recording and also in several other instances of the performance.

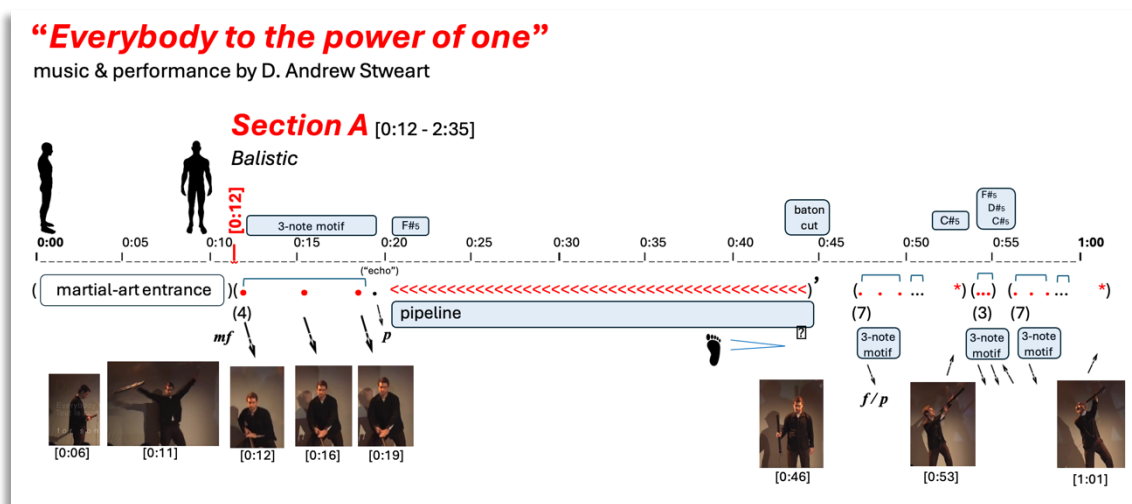


Ex.5 – Two striking recurrences of the 3-note motif in the *Section A'B'* of "Everyone to the power of one": a semitonal cluster and a large-span arpeggiation.



Ex.8 – Glossary of signs and icons to notate musical events, dialog of layers, and gestures for the T-Stick in “Everyone to the power of one”, by D. Andrew Stewart.

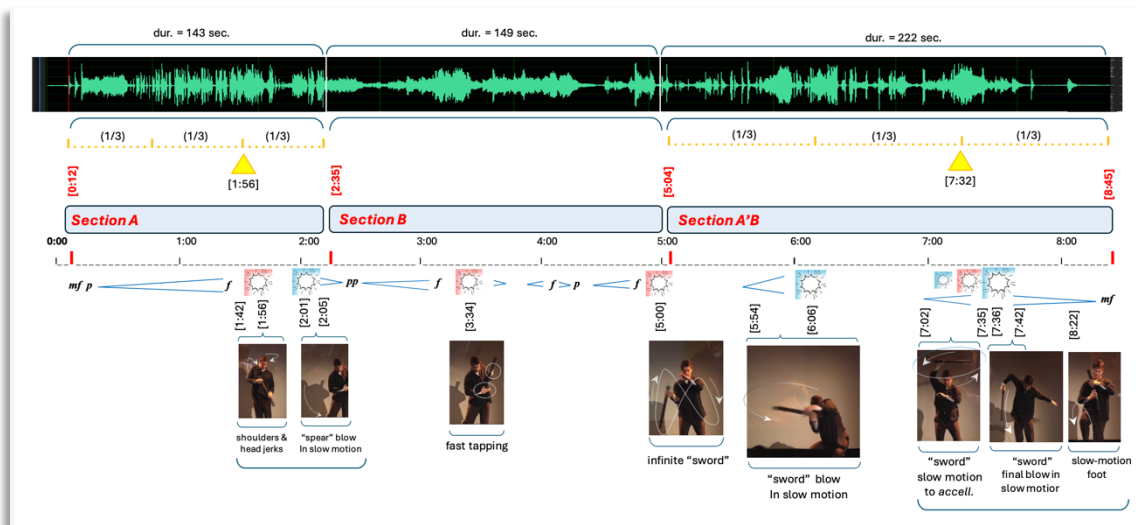
Ex.9 shows a middle-ground representation of the beginning of *Section A*, organized around a timeline with photograms from the video recording, layers and number of events, phrasing, traditional music notation, and respective descriptive keywords.



Ex.9 – Middle-ground representation of the analysis of the beginning of *Section A* from “Everyone to the Power of One”.

Finally the background level allows for a concise view of the whole performance. Ex.10 compiles the main findings of the analysis in a single image containing the sound wave

to which are associated durations, dynamics, climaxes, golden sections and images of main structural gestures with the T-Stick in the three formal sections (*A*, *B* and *A'B'*).



Ex.10 - Background formal analysis of D. Andrew Stewart's performance of "Everyone to the Power of One" showing: sound wave, timeline, duration of main sections (*A - B - A'B'*), dynamics, climaxes, two golden sections (in *Sections A* and *A'B'*), and main gestural actions at structural points.

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