6.3. 'Ironbound'? A sociospatial perspective on network diachrony in the Portuguese metal subfield

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Abstract

Integrated in an undergoing investigation – focused on a wider multidimensional, synchronic and diachronic (1980-2014) analysis of Portuguese metal (both as a cultural/artistic element and as a relational social space - a system and a network of material and symbolic transactions between its creators, publics and mediators), whose main empirical unit lies on the sphere of creation (musicians involved in currently active, on hold or split-up bands/projects linked to the multiple and distinct metal subgenres), on a national scale -, the presentation essays a critical exploration of the partial/provisional data currently collected (stemming from a more quantitatively-oriented analytical dimension of the research). The proposed delimitation of the ever-evolving Portuguese metal scene(s) derives from two main tasks. Firstly, it results from a diachronic account of the morphology/configuration of the aforementioned universe of creators (and their interconnected specific positions in the subfield of Portuguese metal), underlying the main spatial-temporal traits/processes related to: the creation, dissemination and dissolution of bands/projects; the territorial distribution/fragmentation of distinct metal subgenres; the categorization of musical outputs/releases; the creators' connections with other agents involved in the art-world of Portuguese metal music (namely, local and international record labels, events promoters and organizers); secondly, this delimitation arises from the structural analysis of the patterns, regularities and singularities that emerge from the participatory/collaborative (trans)local networks established between bands and musicians - addressing the homophily/assortativity, multiplexity, closure, propinquity and tie strength of their respective connections, the centrality of particular nodes and clusters, as well as the segmentation/cohesion processes present in this artistic subfield.

Keywords: scenes, networks, metal, Portugal

Contextualization

The present article reflects research procedures deployed within a specific dimension of a wider investigation project[2], associated to a multidimensional analysis of Portuguese Heavy Metal music (henceforth, metal) - both as an artistic creation (a myriad of sonic, visual and lyrical codes) and as a socially constructed phenomenon (a dynamic system of material and symbolic interactions/transactions between its creators, public and mediators) -, focusing on the clusters/groups/communities of metal musicians as analytical units for interpreting the (re)constructed and (re)negotiationed identities, affiliations and appropriations *of* and *within*

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this *milieu* (Webb, 2007) - scene and subfield[3] - of Portuguese rock. Based on secondary source analysis procedures, integrated in an exploratory stage of the research, the article essays a diachronic reconstitution of the social relational space of Portuguese metal, its morphology and configuration, by considering the networks of shared membership between bands, in relation to their territorial inscription.

Data collection derived from multiple sources; after the selection of a main secondary source and the constitution of original databases, the compiled information was cross-checked and complemented by data extracted from alternative sources, whenever deemed relevant. That main source (relating bands, their members and discography) was *Encyclopaedia Metallum: The Metal Archives*[4] (M.A.), reputedly the most reliable online metal music database, due to its comprehensive multicriterial account of global metal. Notwithstanding, two additional procedures have been deployed: a systematic articulation with primary sources (namely, the official websites and social network pages of bands[5], whenever available), seeking full substantive and temporal validity of M.A. data; several auxiliary secondary sources were consulted, filling up confirmed information gaps - especially those derived from "overzealous gatekeeping"[6], temporal distance[7] and regional omissions[8]. Still, genre inclusion in metal music and having at least one release remained central criteria for cataloging. In sum, M.A., as the main source, provided data for 1092 bands (76.4%) and the auxiliary sources contributed with the remaining 336 cases.

[3] In an attempt to articulate, in our perspective of Portuguese metal, "long-range" theory, such as the bourdieusian conceptualization of "fields" (as a system of social positions and, more specifically, as a social arena of struggle over the appropriation of certain species of capital - cf. Bourdieu, 1993; Hilgers & Mangez, 2004) with "middle-range" contributions such as the subcultural and post-subcultural perspectives on, respectively, music-based subcultures, neo-tribes and scenes (cf. Hebdige, 1979; Maffesoli, 1998; Bennett, 1999; Bennett & Kahn-Harris, 2004; Shildrick & MacDonald, 2006; Negus, 1996), analysing metal music as a social construct and as a relational social space (Bourdieu, 1984, 1996, 1997) requires that it be referred to as a "subfield" (historically circumscribed, it still appears as fairly dependent and correlational vis-à-vis the positions and forces that permeate the broader fields of music and art production, as well as the contemporary cultural contingencies, pluralities and instabilities) – cf. Becker, 1982; Crane, 1992; Guerra, 2013:183.

[4] See: http://www.metal-archives.com.

[5] Sources: Facebook, MySpace and Bandcamp.

[6] This relates to uncatalogued (in M.A.) Portuguese bands which, although standing in some "genre-crossover" positions, are commonly associated to metal music both by fans, the specialized media and other musicians, develop their live performances mostly in metal festivals or events, and have a following significantly composed of metal fans, therefore having clear sociological affiliations to the metal subfield. The website Spirit of Metal (http://www.spirit-of-metal.com), the two most representative Portuguese online forums (Metal Underground and Irmandade Metálica), as well as the "benchmark" national specialized news sites SoundZone and Perigo de Morte, were the selected auxiliary secondary sources.
Cf. http://www.metalunderground.pt/; http://irmandademetalica.forumeiros.com/; http://perigo-de-morte-new.blogspot.pt/; http://www.soundzonemagazine.com/.

[7] Being a fairly recent site (founded in 2002), the M.A. can be somewhat omissive concerning some relevant Portuguese bands from the 80s; to diminish this effect of "temporal omission", the blog Portugal 80s Metal (http://portugal80smetal.blogspot.pt/) was systematically consulted.

[8] In this instance, several auxiliary sources, dedicated to local metal scenes of some more or less peripheral portuguese regions, were relevant – Metalicídio (Azores), Vila Metal (the northern region of Trás-os-Montes) and Portalegre Core (Alto Alentejo).
Cf. http://metalicidio.com/bands/lista/; http://vilametal.blogspot.pt/; http://www.portalegrecore.com.

Portuguese metal – between subfield, art world and network

Territorial(ized) traits of the structure and dynamics of the Portuguese Metal Subfield (PMS) invoke the bourdieusian perspective on the complex relations established between physical and social spaces: just as physical space is defined by the mutual externality of parts (with a central perception of difference at the basis of the very notion of space, i.e., a set of distinct and coexisting positions which are exterior to one another and are defined in relation to one another through relations of proximity, vicinity, or distance, as well as through order relations, such as above, below and between), so is social space defined by the mutual exclusion (or distinction) of positions which constitute it, as a structure of juxtaposition of social positions (1996: 11-12).

Following this notion, the social space of the PMS is based on an a set of relationships which tends to retranslate itself, more or less directly, into physical space in the form of a definite distribution arrangement of agents and properties, just as much as the produced physical distinctions resonate in the appropriated social space. As "subfield", Portuguese metal *milieu* has its own set of particular and relatively autonomous *enjeux*, its own stakes and interests, which motivate and give consistency to a permanent relational kinesis of struggle for the monopoly of the imposition of legitimate categories of perception and appreciation, within a space of objective relations between positions defined by their rank in the distribution of competing powers or species of capital; PMS can also be viewed as a field of forces, where underlying objective relations structure manifest social relationships, tending either to orthodoxy (by agents standing in dominant positions in terms of detention and imposition of the specific capitals – or combination of capitals – most valued in the field, therefore deploying "preservation strategies") or to heterodoxy (by agents in dominated positions, which tend to develop ""subversive strategies", intended to transform the power relations within that arena) - cf. Bourdieu & Wacquant, 1992; Guerra, 2013: 82-89.

However, relating the PMS, the bourdieusian overview of fields requires articulation with other theoretical perspectives - namely, Becker's view on "art worlds"[9] (1982) and Social Network Analysis (SNA). Two main aspects justify this articulation:

- Firstly, to reconstruct the real connections established between structures and interactions in this subfield, since in Bourdieu, the concept of "objective relations" (that compose the fields) seems somewhat irrevocably divorced from concrete social relationships. Interaction itself (via processes of mutual adjustment and the sharing of information, networks of agents actively converge on lifestyles, transforming prior aspects of their lifestyles to unify practices – Bottero, 2010) must be reappraised as a central component in the reproduction and transformation of the fields, questioning an undisputed primacy of social structure over any reference to the actions of people doing things together which create those structures;
- Secondly, to complement the bourdieusian permanently conflictual focus on (material and symbolic) power struggles and relations with a not less relevant assessment of cooperation (rather than focussing solely on the question of who dominates who, using

[9] "Art Worlds", as "the network of people whose cooperative activity, organized via their joint knowledge of conventional means of doing things, produce(s) the kind of art works that art world is noted for" (Becker, 1982) – or as Sarah Thornton puts it, "a loose network of overlapping subcultures held together by a belief in art" (2008:43).

what strategies and resources, with what results, it discerns who is doing what with who that affects the resulting work of art (Becker, 1982).

Applied to the PMS, these 'articulations' will be essayed on contemplating one of the three key analytical vertices of "art worlds"[10]: Networks.

Portuguese metal and the difference(s) time (re)makes…

Sociospatial differentiation in PMS maintains no neutral bond with time itself. In fact, it can only be fully comprehended in the light of temporal (re)arrangements of the sets of relations and (dis)positions that characterize it in specific periods (*Table 3*). Agreeing with Mayer & Timberlake (2004) in the assumption that metal music is, in most cases, included in a decentralized political-cultural system of diffusion (as it mainly involves individual - or clusters of - decentralized non-institutional actors - namely, bands, fans and non-central mediators - and, due to its often accentuated distance from more marketable mainstream music genres, presents no more than residual economic motivations) (cf. Wejnert, 2002; Cushman, 1991), PMS evolution – amidst innumerous regional adaptations, and specific connections between emergent local scenes and emergent subgenres (Kahn-Harris, 2000, 2002; Lucas, Deeks, Spracklen, 2011; Shank, 1994) – displays many of the major traits depicted in the Rogers' Curve of Innovation and Adoption[11] (CIA) - applying the different categories of adopters to distinct regional frameworks. Hence, the transitions between "Pioneer/Innovator"[12], Early-Adoption[13], Early-Majority[14], Late-Majority[15] and "Laggard"[16] stages project a prominent structural trait of the subfield: its firm correlation to the territorial idiosyncrasies of the urban system development in the last decades. Not only are "Late-Adopter" and "Laggard" regions predominantly typified by the combined presence of "*Very Small Dimension*" and "*Small Dimension Urban Areas*" (Classes 1 and 2) with comparatively rarer case presence of "*Medium-Sized-and-Intermediately-Dynamic-Urban-Areas*" (Class 3), the "Pioneer" and "Early-Adopter" areas also display the antipodal prevalence of "*Metropolitan Centres*", "*Large-Sized, Highly Dynamic Urban Centres with high Population and Employment Densities*" and "*Medium-Sized Highly Dynamic Urban Areas*" (Classes 7, 6 and 5, respectively) – basically

[10] The triangular connection between "resources", "conventions" and "networks (of interaction)" is based on the fact that "conventions" – i.e. earlier set agreements that have become customary in a specific art world – display a basic framework for action and strategy coordination between actors; "networks (of interaction)" derive from and permit the collective action involved in artistic production – i.e., they facilitate the emergence and diffusion of conventions, while being bounded by them (art worlds' networks only extend and endure to a point where acceptance and adherence of conventions are maintained); resources (material or symbolic) depend on networks to flow / circulate - whilst defining their boundaries (networks only extend and endure to the point where exchange of adequate or relevant resources is maintained) and be exchanged in the process of artistic (inter)activity (Becker; 1982).

[11] Everett Rogers (2003) defines an adopter category as a classification of individuals within a social system on the basis of innovativeness, suggesting a total of five categories of adopters in order to standardize the usage of adopter categories in diffusion research, and stating that the adoption of an innovation follows an S curve when plotted over a length of time – cf. Fischer, 1971.

[12] Maps 1,-2,-3.

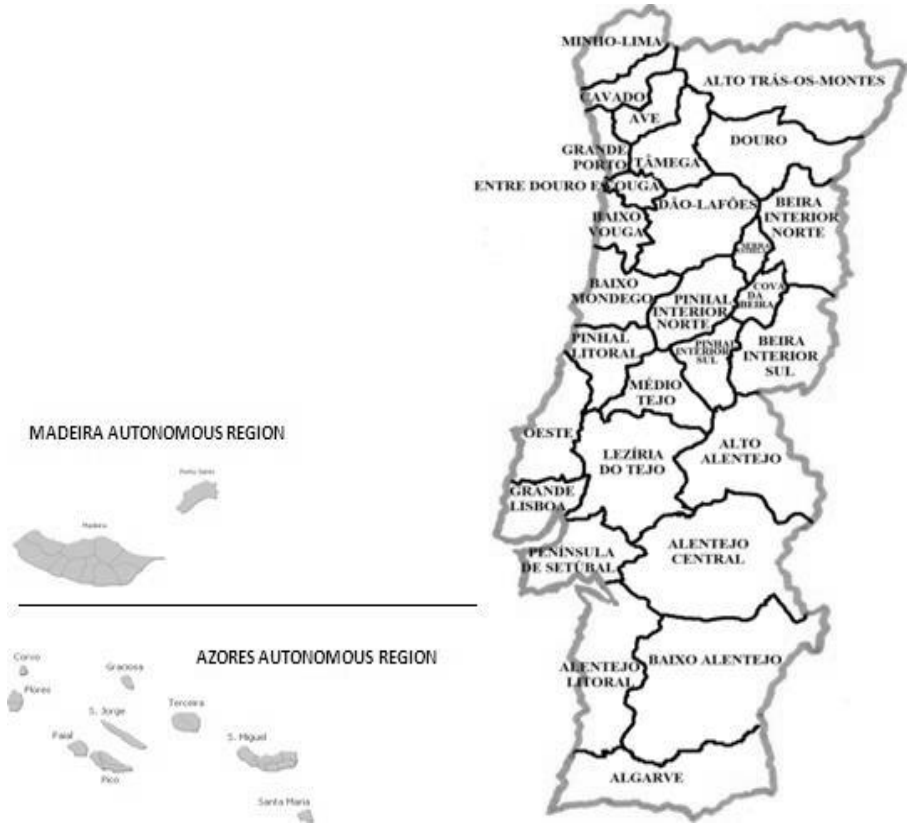
[13] Maps 1,-2,-4.

[14] Maps 1,-2,-5.

[15] Maps 1,-2,-6,-7.

[16] Maps 1,-2,-8.

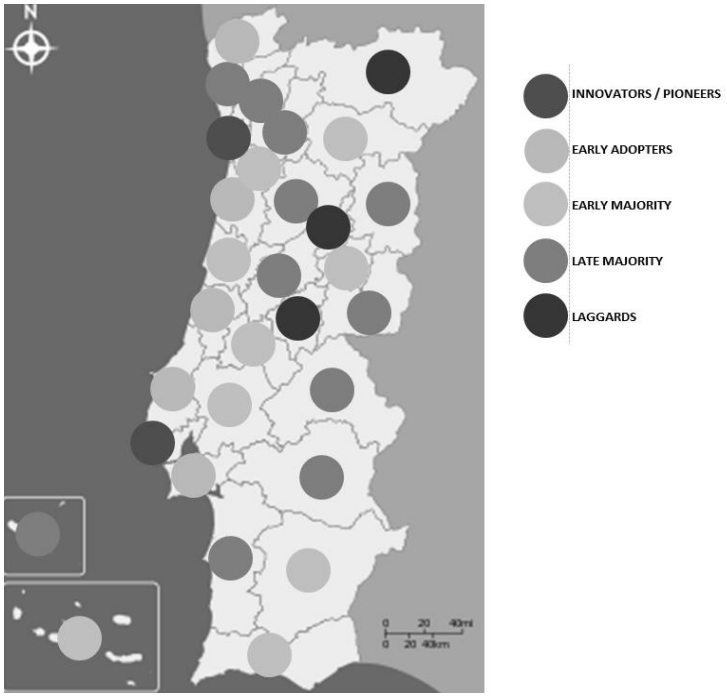
corresponding to the more attractive and dynamic regions in terms of the demographic, economic and employment structures[17].



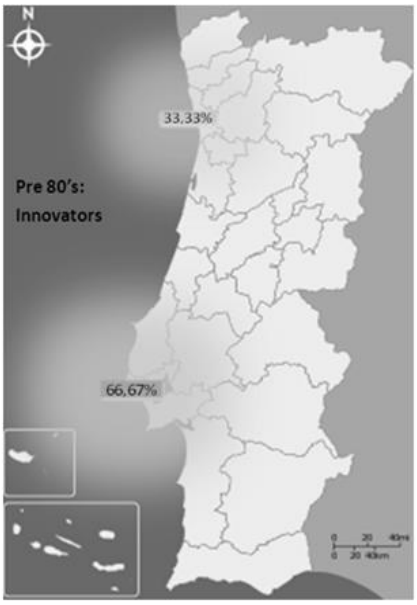
Map 1 – Portugal (continental and insular) – NUTS III Division[18]

[17] Cf. the 7 Levelled Typology of Urban Areas in the Portuguese Urban System (Marques, 2004; Marques & Ferrão, 2003).

[18] The territorial division is based on the consideration of a NUTS (Nomenclature of Territorial Units fos Statistics) III level as the preferable geocode standard for referencing the countries' subdivisions for the present article, which points out to the existence of 30 distinct NUTS III regions in continental and insular Portugal.

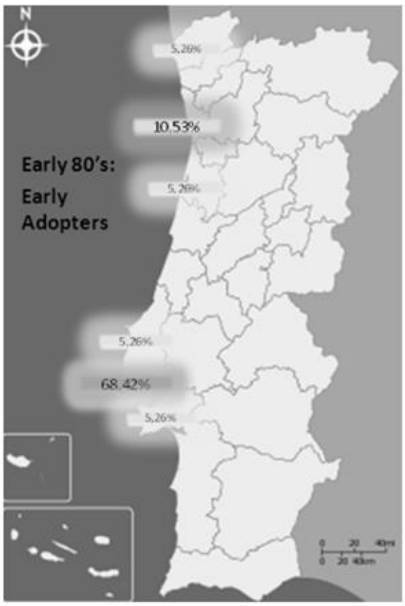


Map 2 – Portugal (continental and insular) – NUTS III / Type of Region



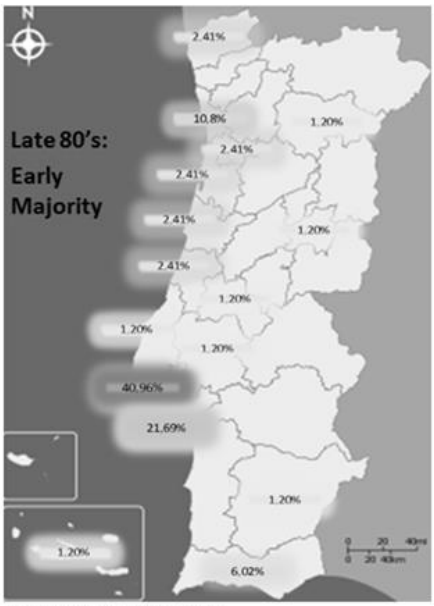
Pionner Stage main features:
Marked by the pivotal role of the two largest urban areas of the country , with the **Greater Lisbon** and **Greater Porto** regions as the only territorial pinpoints of the still fairly embryonic national metal scene in the pre-80s era

Map 3 – Metal Bands in the Pre 80s



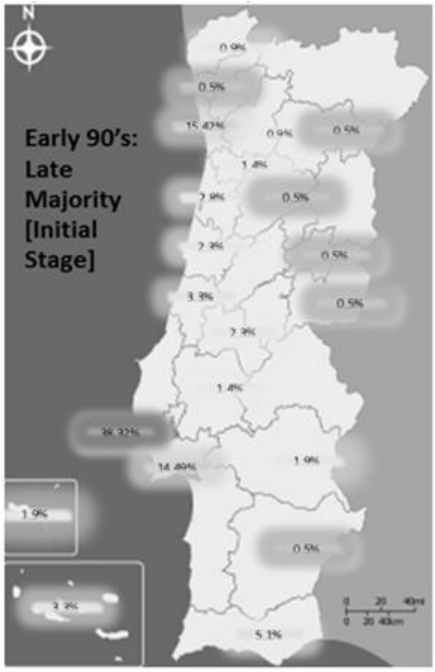
Early Adopter main features:
Anchored in a pattern of **urban periphery diffusion**, with this stage preserving its dissemination logics throughout the mid 80s, yielding the emergence of small local metal scenes in a slightly larger geographical scope, albeit maintaining a pattern of utter **concentration in the coastal areas**

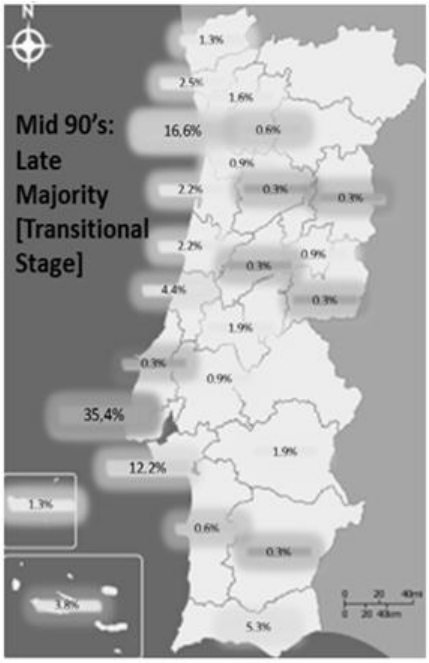
Map 4 – Metal Bands in the Early 80s



Early Majority main features:
Four main fluxes can be discriminated, with diffusion to: almost all coastal regions; the adjacent areas of coastal regions with previously established local metal scenes - as we can see in the cases of the **Lezíria do Tejo** and **Entre Douro e Vouga** regions; to inland regions; to an islander context, with the first bands appearing in the **Azores** Archipelago

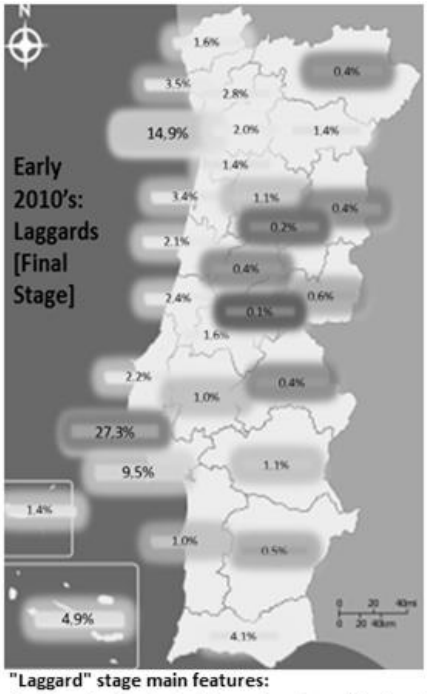
Map 5 – Metal Bands in the Late 80s





Late Majority main features:
A profoundly expansionist period - cf. Dico, 2013; Almeida, 2010 -, in the Early 90s, consisting of four main diffusion fluxes, moving to: some of the, at the time, more **isolated and ruralized inland areas**; several **regions adjacent to the coastal regions**; a full **completion of the shoreline coverage**; **full islander dissemination** - Madeira Autonomous Region

Map 6, 7 – Metal Bands in the Early and Mid 90s



"Laggard" stage main features:
Starting in the Late 90s and only achieving full completion in the Early 2010's (the first time in which all NUTSIII began displaying local scenes), mainly involving **some of the most isolated regions in Portugal**, with a structural peripheral position in the country's urban system (Alto Trás-os-Montes, Serra da Estrela and Pinhal Interior Sul regions)

Map 8 – Metal Bands in the Early 2010s

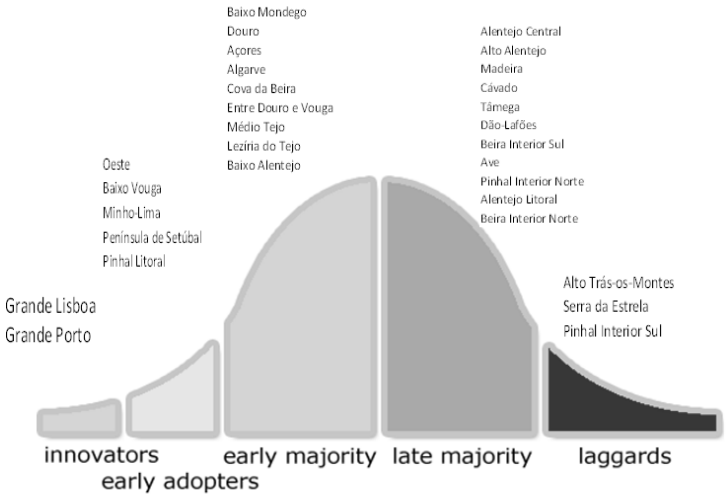


Figure 1 – Curve of Innovation/ Adoption (CIA) in Portuguese Metal

Current Activity Status	N	%
Active	781	54,69%
Changed Name	65	4,55%
On Hold	37	2,59%
Split-Up	465	32,56%
Unknown	80	5,60%
Total	**1428**	**100,00%**

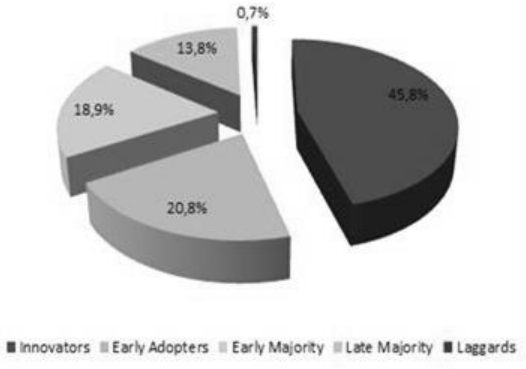
Table 1 – Bands by Current Activity Status (June 2014)

NUTSIII	Active	Changed Name	On Hold	Split-Up	Unknown	Total	Weight in Total Number of Bands [%]	Activity Rate [%]
Açores	39	2	1	22	4	68	4,76%	57,35%
Alentejo Central	9			6	2	17	1,19%	52,94%
Alentejo Litoral	8		2	2	1	13	0,91%	61,54%
Algarve	28	4	3	16	6	57	3,99%	49,12%
Alto Alentejo	3				1	4	0,28%	75,00%
Alto Trás-os-Montes	3			3		6	0,42%	50,00%
Ave	21	2	1	14		38	2,66%	55,26%
Baixo Alentejo	3		1	4		8	0,56%	37,50%
Baixo Mondego	18	3		11	1	33	2,31%	54,55%
Baixo Vouga	27	1		14	3	45	3,15%	60,00%
Beira Interior Norte	4					4	0,28%	100,00%
Beira Interior Sul	6			1		7	0,49%	85,71%
Cávado	28	3		15	1	47	3,29%	59,57%
Cova da Beira	16			2	1	19	1,33%	84,21%
Dão-Lafões	10			3		13	0,91%	76,92%
Douro	10	2		7	1	20	1,40%	50,00%
Entre Douro e Vouga	13			5		18	1,26%	72,22%
Grande Lisboa	218	20	11	147	20	416	29,13%	52,40%
Grande Porto	117	15	8	64	9	213	14,92%	54,93%
Lezíria do Tejo	8			6		14	0,98%	57,14%
Madeira	12	1		8	1	22	1,54%	54,55%
Médio Tejo	13		1	9		23	1,61%	56,52%
Minho-Lima	10		2	6	1	19	1,33%	52,63%
Oeste	20	1		7	2	30	2,10%	50,00%
Península de Setúbal	70	7	1	59	12	149	10,43%	100,00%
Pinhal Interior Norte	2		1	1		4	0,28%	44,19%
Pinhal Interior Sul	1					1	0,07%	50,00%
Pinhal Litoral	19	3	1	18	2	43	3,01%	66,67%
Serra da Estrela	1				1	2	0,14%	57,14%
Tâmega	14		1	4	2	21	1,47%	50,00%
Multiple International Affiliation	4		1	1	1	7	0,49%	66,67%
Multiple National Affiliation	2		1	1		4	0,28%	46,98%
Unknown / Non Identified	24	1	1	9	8	43	3,01%	55,81%
Total [PT]	**781**	**65**	**37**	**465**	**80**	**1428**	**100,00%**	**54,69%**

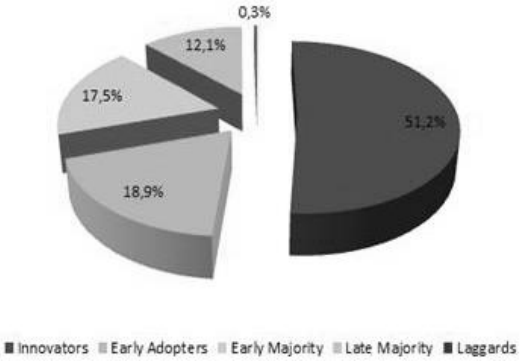
Table 2 – Bands by Activity Status and NUTS III

NUTSIII	Period Pre-80's	Early 80's	Mid 80's	Late 80's	Early 90's	Mid 90's	Late 90's	Early 2000's	Mid 2000's	Late 2000's	Early 2010's	Since 2014	Timing
Grande Lisboa	66,7%	68,4%	58,6%	41,0%	38,3%	35,4%	33,4%	28,7%	27,7%	27,2%	27,3%	28,0%	Innovators
Grande Porto	33,3%	10,5%	17,2%	10,8%	15,4%	16,6%	14,0%	12,9%	14,8%	14,3%	14,9%	15,0%	Innovators
Oeste		5,3%		1,2%		0,3%	0,5%	1,8%	2,0%	2,3%	2,2%	2,5%	Early Adopters
Baixo Vouga		5,3%	3,4%	2,4%	2,8%	2,2%	2,3%	2,2%	3,2%	3,8%	3,4%	3,4%	Early Adopters
Minho-Lima		5,3%	6,9%	2,4%	0,9%	1,3%	1,6%	0,8%	0,6%	0,8%	1,6%	1,3%	Early Adopters
Península de Setúbal		5,3%	10,3%	21,7%	14,5%	12,2%	11,4%	11,5%	10,4%	9,8%	9,5%	9,3%	Early Adopters
Pinhal Litoral			3,4%	2,4%	3,3%	4,4%	4,4%	3,2%	2,8%	2,7%	2,4%	2,3%	Early Adopters
Baixo Mondego				2,4%	2,3%	2,2%	3,6%	2,6%	1,7%	2,3%	2,1%	2,1%	Early Majority
Douro				1,2%	0,5%		0,8%	2,0%	1,8%	1,6%	1,4%	4,8%	Early Majority
Açores				1,2%	3,3%	3,8%	4,7%	5,1%	5,2%	5,5%	4,9%	4,2%	Early Majority
Algarve				6,0%	5,1%	5,3%	5,2%	4,8%	4,6%	4,1%	4,1%	1,9%	Early Majority
Cova da Beira				1,2%	0,5%	0,9%	1,8%	2,0%	1,8%	1,6%	1,7%	1,6%	Early Majority
Entre Douro e Vouga				2,4%	1,4%	0,9%	0,5%	1,2%	1,4%	1,3%	1,4%	1,2%	Early Majority
Médio Tejo				1,2%	2,3%	1,9%	0,8%	1,8%	1,5%	1,6%	1,6%	1,5%	Early Majority
Lezíria do Tejo				1,2%	1,4%	0,9%	0,5%	1,0%	0,9%	1,1%	1,0%	0,9%	Early Majority
Baixo Alentejo				1,2%	0,5%	0,3%	0,3%	1,0%	0,9%	0,7%	0,5%	0,4%	Early Majority
Alentejo Central					1,9%	1,9%	1,6%	1,4%	1,5%	1,3%	1,1%	1,2%	Late Majority
Alto Alentejo					0,5%			0,2%	0,3%	0,2%	0,4%	0,4%	Late Majority
Madeira					1,9%	1,3%	0,8%	1,4%	1,7%	1,5%	1,4%	1,3%	Late Majority
Cávado					0,5%	2,5%	3,1%	3,4%	3,2%	3,6%	3,5%	3,2%	Late Majority
Tâmega					0,9%	0,6%	1,6%	1,4%	1,8%	1,8%	2,0%	1,9%	Late Majority
Dão-Lafões					0,5%	0,3%	0,8%	1,0%	0,8%	1,0%	1,1%	1,1%	Late Majority
Beira Interior Sul					0,5%	0,3%	0,3%	0,6%	0,9%	0,8%	0,6%	0,7%	Late Majority
Ave						1,6%	2,3%	2,2%	2,8%	2,9%	2,8%	2,5%	Late Majority
Pinhal Interior Norte						0,3%				0,4%	0,3%	1,1%	Late Majority
Alentejo Litoral						0,6%	0,8%	1,0%	1,1%	1,0%	1,0%	0,4%	Late Majority
Beira Interior Norte						0,3%	0,5%	0,6%	0,5%	0,4%	0,4%	0,2%	Late Majority
Alto Trás-os-Montes							0,5%	0,4%	0,5%	0,5%	0,4%	0,3%	Laggards
Serra da Estrela									0,2%	0,2%	0,2%	0,2%	Laggards
Pinhal Interior Sul											0,1%	0,1%	Laggards
Unknown / Non Identified					0,5%	1,3%	1,8%	3,0%	2,8%	2,7%	3,5%	3,8%	
Multiple International Affiliation					0,5%	0,3%	0,3%	0,2%	0,5%	0,5%	0,5%	0,6%	
Multiple National Affiliation								0,2%	0,3%	0,5%	0,4%	0,3%	
Total (PT)	**100,00%**	**100,00%**	**100,00%**	**100,00%**	**100,00%**	**100,00%**	**100,00%**	**100,00%**	**100,00%**	**100,00%**	**100,00%**	**100,00%**	

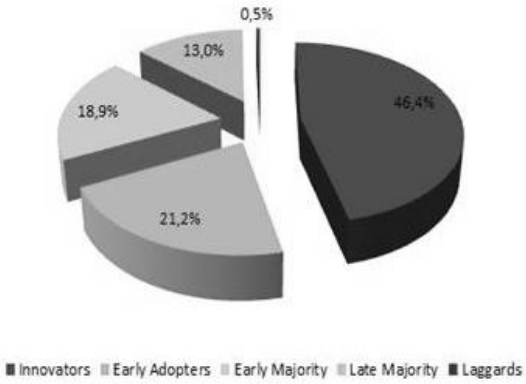
Table 3 – Relative Weight (%) of Active Bands by NUTS III and Period



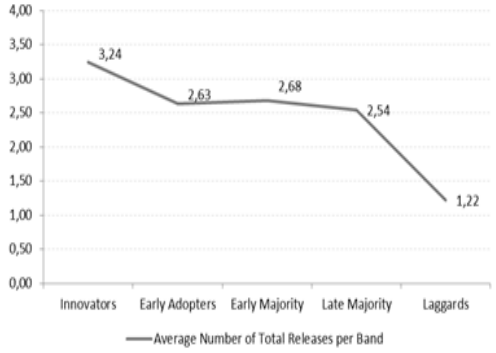
Graph 1 – Distribution (%) of Bands by Types of Regions (CIA Position)



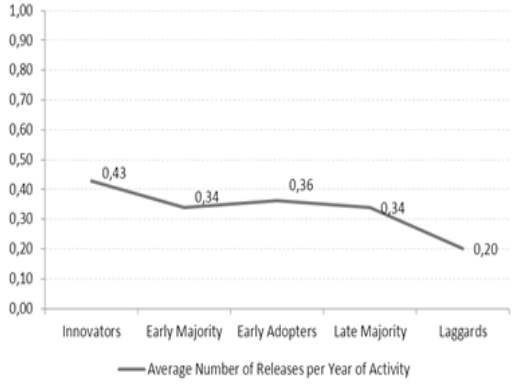
Graph 2 – Distribution (%) of Total Releases by Types of Regions (CIA Positions)



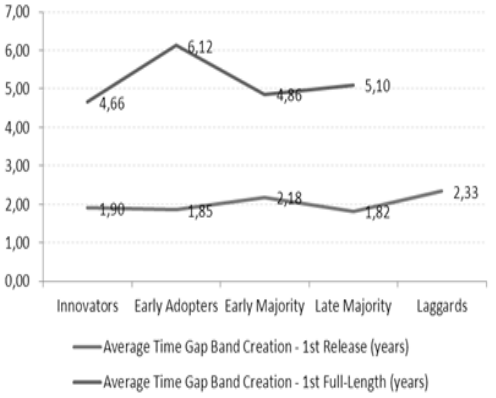
Graph 3 – Distribution (%) of Musician Participations by Types of Regions (CIA Positions)in the Late 80s



Graph 4 – Average Number of Releases within Types of Regions (CIA Positions)



Graph 5 – Average Number of Releases per Year of Activity



Graph 6 – Time Gaps (years) between Band Creation/ 1st Release/ 1st Full-Length

PMS Networks and the Difference(s) Ties (re)make(s)…

Amidst the beckerian triangle, we shall solely focus in one of its vertices: *Networks*. "*Resources*" (relating this, it must suffice to say that resource inequalities project a very strong correlation with the time-space coordinates of Portuguese metal diffusion: be it in terms of the number of bands and participations – *Table 3*, *Graphs 1* and *3* -, or outputs released and specific conditions in which these occur - *Graphs 2*, *4*, *5* and *6*; resources distribution stresses very clear distinctions between the "constraints" and "possibilities" associated to CIA positions) and "*Conventions*" (taking subgenre differentiation as the main artistic convention in metal music's Artistic Classification System - Weinstein, 1991a, 1991b; Walser, 1993; DiMaggio, 1987 -, it must suffice to say that, either by means of a distinct conjugation of subgenres, miscegenating more overtly orthodox or heterodox inscriptions in the subfield's canons, or via idiosyncratic appropriations of some of these very same subgenres, marked by the introduction of specific local(ized) nuances in their output , the participation of Portuguese metal bands in the "game of subgenre conventions" largely encompasses their capacity to get recognized, noticed and admitted, and so to win a place in the social order of the subfield – cf. Bourdieu, 1984; in this case, conventions seem to be more attached to a dimension of "field possibilities" than to its structural constraints) will then be put aside.

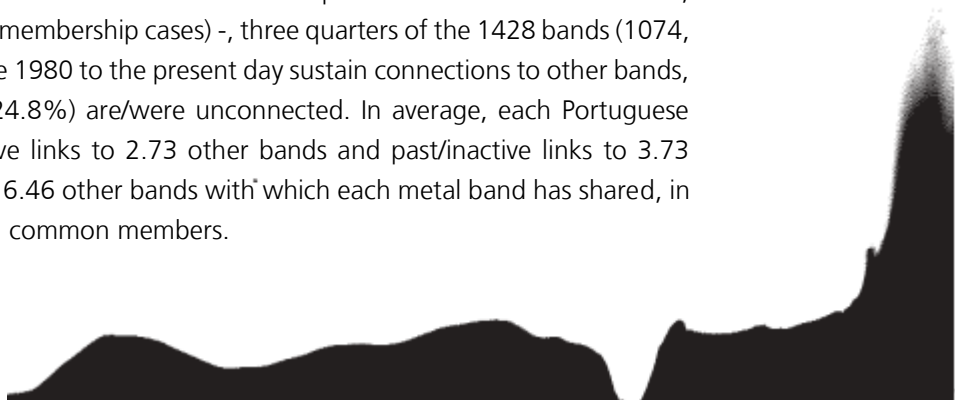
Despite the differences between Social Network Analysis (SNA) and more "conventional" approaches and perspectives in Social Sciences (a major one being that SNA focuses on the relations among actors, and not individual actors and their attributes – Hansen et al., 2011; Wasserman & Faust, 1994 – i.e., its focus is *between*, not *within* actors), SNA has been, in recent years, widely used as a tool of theoretical and empirical enrichment in a growing number of academic fields and scientific researches (Crossley, 2008a, 2008b, 2009; Haythornthwaite, 1996; Buda & Jarynowsky, 2011), complementing methods that focus more narrowly on individuals, adding a critical dimension that captures the connective tissue of societies and other complex interdependencies.

Applied to PMS, SNA can be used to point out multiple ways in which networks create opportunities and constraints for (inter)actors which affect their (inter)actions, articulating the extraction of "structures", "positions" and "relations" between "positions" (Bourdieu), and the empirical connections of joint action and cooperation (Becker). This allows "*world*" analysis to address the issues of *field* analysis, without sacrificing its strengths or succumbing to the problems of field analysis (Bottero & Crossley, 2011).

We shall try to capture these dimensions of constraints and opportunities in four different dimensions of the networks: general connectedness; territorial distribution of ties; diachronic patterns of networks and their structure; and individual positioning (with)in networks.

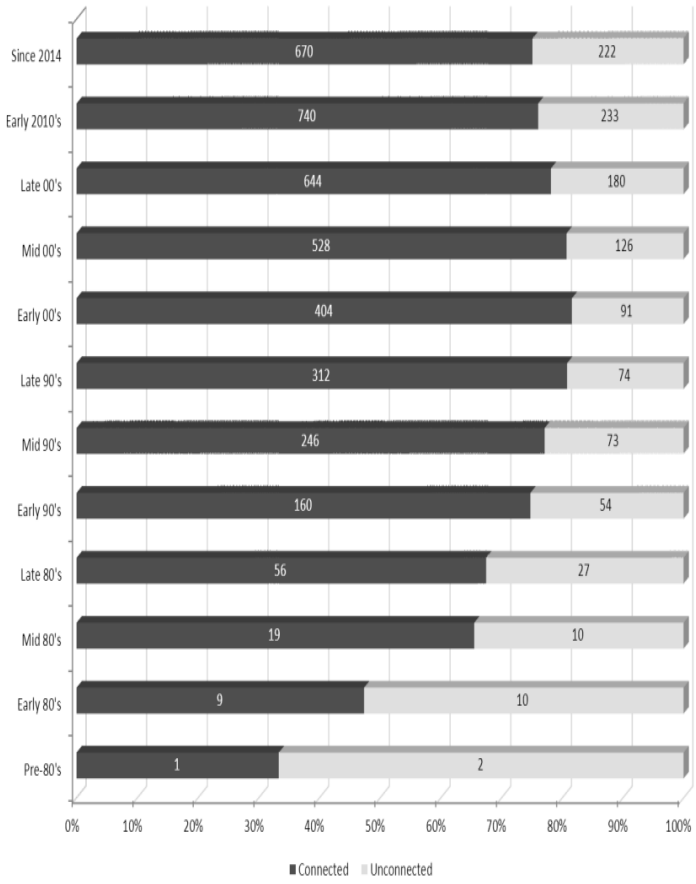
General connectedness

Considering the most basic condition of metal bands in regard to networks - their general connectedness (i.e., having or not established current or past liaisons with other bands, following a criterion of common membership cases) -, three quarters of the 1428 bands (1074, 75.2%) that constitute PMS since 1980 to the present day sustain connections to other bands, which means that 354 bands (24.8%) are/were unconnected. In average, each Portuguese metal band holds currently active links to 2.73 other bands and past/inactive links to 3.73 bands, summing up to a total of 6.46 other bands with which each metal band has shared, in a given moment of their careers, common members.



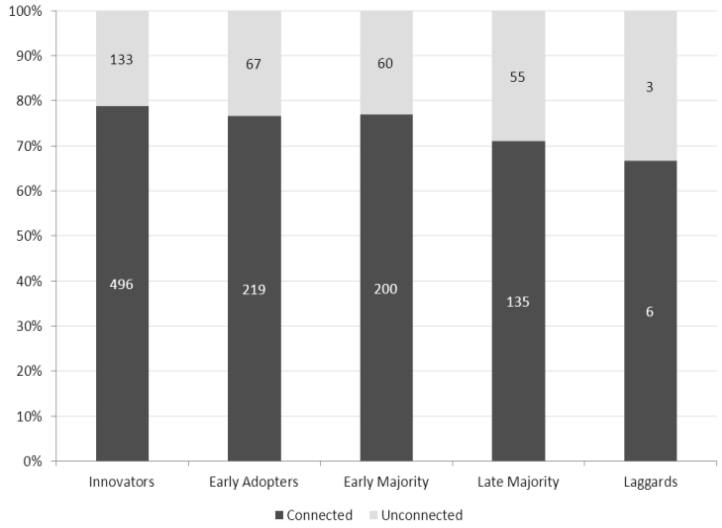
Connectedness of bands has steadily increased throughout time; ever since 1980 until the Early-2000s (when it reached its highest point 81.6% of the bands with confirmed activity between the years 2000 and 2003 had at least one link of common membership with at least one other band), this growth trend was uninterrupted. Since then, the block of active bands with no reported connections of shared membership with others has slightly increased.

The territorialized distribution of overall connectedness (Graph 8) correlates, yet again, to the specific positions occupied by the ideal-type CIA regions. The two extremes – "Innovator" and "Laggard" regions – present, respectively, the highest and lowest percentage of connected bands (78.9% and 66.7%), a pattern complemented by a relatively clear decreasing tendency as we move towards areas with a shorter track record on PMS[19]. However, a finer look, considering the internal distribution (in each type of region) of connectedness within time periods, marks a considerable progression in the availability of this particular resource – shared memberships – in the subfield, especially in the "Laggard" regions.

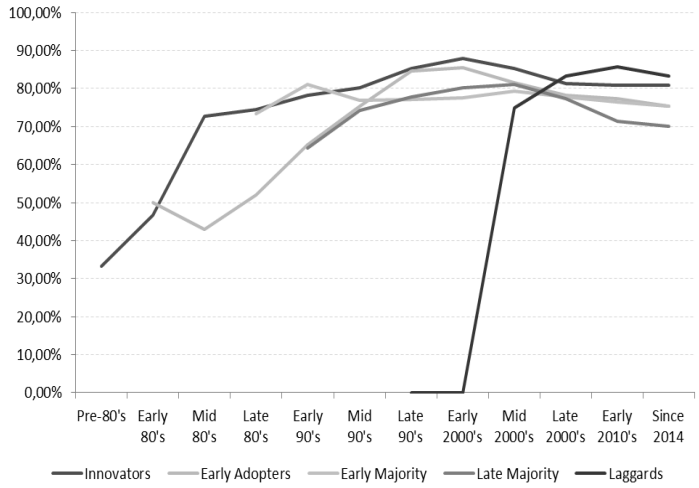


Graph 7 – Global (Un)Connectedness of Bands within Periods of Activity

[19] When considering the connectedness levels within the ranks of active bands at the end of 2013, and with the exception of the "Laggard" regions – which display an 85.7% (6 out of 7 active bands) rate – this pattern becomes even clearer, as we move from the "Pioneer" regions to the "Late-Majority" areas, via the "Early-Adopter" and "Early-Majority" territories (with a decreasing curve of 80.7%, 77.4%, 76.5% and 71.3%, respectively).



Graph 8 – Global (Un)Connectedness by Types of Regions



Graph 9 – Connectedness (Internal % Distribution) of Active Bands within Time Periods by Types of Regions

Territorial distribution of ties

An overview of the global network of bands highlights a total of 4907 connections (ties, edges or links, based on the single criterion of past or present emergence of common membership cases) between nodes - bands which share(d) one or several individual[20] members, since 1980 to June 2014. Concerning tie activity, 947 edges (19.3%) are currently active[21] and 3960

[20] Overall, each of the 5723 individual participants in Portuguese metal bands generates an average of 0.86 links of shared membership/participation between bands.

[21] Cases in which a musician is a current member or a live/session musician in both nodes (s)he connects.

(80.7%[22] of all ties) of them are presently inactive[23]. Here again, the CIA position (CIAP) has significant impact in the way bands establish ties; in terms of CIAP homogamy/heterogamy, out of 4317 classifiable[24] cases, 839 are active ties, 75.8% of which (636) are established between homogamous bands (pertaining to the regions with the same CIAP). Subfield prevalence of Innovator regions is reconfirmed: active ties between bands included in this CIAP represent more than 41% of the total currently active ties (clearly standing out as the most significant homogamous combination) - Table 4; additionally, if we consider the sum of cases in which at least one of the connected bands is associated to this CIAP, Innovator territories represent more than 63% of all established active ties[25].

Homogamy / Heterogamy	Regions (Band 1_Band 2)	Active	Inactive	Total	%(within Total of Active Ties)	%(within Total of Inactive Ties)	%(within Total of Ties)
Homogamy	Innovators_Innovators	349	1523	1872	41,60%	43,79%	43,36%
Homogamy	Early Adopters_Early Adopters	136	504	640	16,21%	14,49%	14,83%
Homogamy	Early Majority_Early Majority	116	367	483	13,83%	10,55%	11,19%
Heterogamy	Innovators_Early Adopters	112	498	610	13,35%	14,32%	14,13%
Heterogamy	Innovators_Early Majority	44	168	212	5,24%	4,83%	4,91%
Homogamy	Late Majority_Late Majority	35	200	235	4,17%	5,75%	5,44%
Heterogamy	Innovators_Late Majority	24	103	127	2,86%	2,96%	2,94%
Heterogamy	Early Majority_Late Majority	12	16	28	1,43%	0,46%	0,65%
Heterogamy	Early Adopters_Early Majority	9	53	62	1,07%	1,52%	1,44%
Heterogamy	Innovators_Laggards	2	0	2	0,24%	0,00%	0,05%
Heterogamy	Early Adopters_Late Majority	0	40	40	0,00%	1,15%	0,93%
Heterogamy	Early Adopters_Laggards	0	1	1	0,00%	0,03%	0,02%
Heterogamy	Early Majority_Laggards	0	1	1	0,00%	0,03%	0,02%
Heterogamy	Late Majority_Laggards	0	0	0	0,00%	0,00%	0,00%
Homogamy	Laggards_Laggards	0	4	4	0,00%	0,12%	0,09%
		839	3478	4317	100%	100%	100%

Table 4 – Ties (Active/ Inactive) between Ideal-Type Regions, according to their CIA Homogamy/ Heterogamy

Ideal-Type Regions	Active	Inactive	Total	%(within 839 Active Ties)	%(within 3478 Inactive Ties)	%(within 4317 Ties)
Innovators	531	2292	2823	63,29%	65,90%	65,39%
Early Adopters	257	1096	1353	30,63%	31,51%	31,34%
Early Majority	181	605	786	21,57%	17,40%	18,21%
Late Majority	71	359	430	8,46%	10,32%	9,96%
Laggards	2	6	8	0,24%	0,17%	0,19%

Table 5 – Ideal Type Region Involvement in Active/ Inactive Tie establishment (within Region or with other CIA Regions)

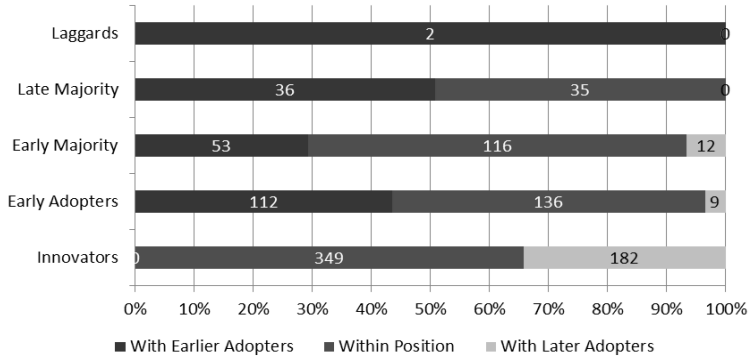
[22] 34 years of accumulated history in terms of the musicians' trajectories within and between bands are being considered.

[23] Reflecting cases in which a musician is no longer part of the current line-up or a present live/session musician in one or the two bands linked.

[24] Cases of singular bands with multiple national affiliations involving more than one ideal-type region have been excluded. International ties have, of course, also been excluded.

[25] Table 5 also demonstrates the impact of CIAP on the bands' networks, as a clear decreasing pattern of the percentage weight emerges as we move to the areas with more recently established local metal scenes (in terms of Active, Inactive and Total Ties).

Only the Innovator regions have presently established ties with all other types of regions[26], consolidating a general effect of subfield dominance both in terms of maintaining the highest rate of "within position" active ties – i.e., having more than 65% of its total currently established active ties located within its internal scope (see *Graph 10*) – and, naturally, sustaining the highest percentage of active ties with regions that have "adopted" metal later.



Graph 10 – Distribution of Active Ties in Ideal Type Regions (within Region or with other CIA Regions)

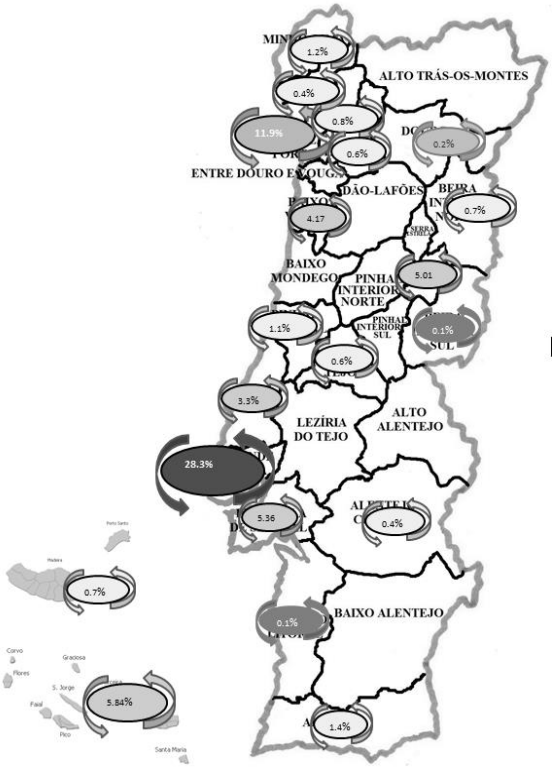
Regional distribution of active ties – *Table 6*, *Maps 9* and *10* - confirms its prominence in PMS structuration and network dynamics. Edges between bands from the same region account for 72.5% of all active ties, with a clear quantitative predominance associated to the coastal line of the country as well as to the Pioneer and Early-Majority areas – the Greater-Lisbon, Greater-Porto and Setúbal-Peninsula regions concentrate 45.7% of all active ties and almost 63% of all currently shared memberships within the same region, whereas 10 NUTSIII display no current intra-regional activity in terms of shared memberships (Map 9), a situation that is felt in only 4 regions in terms of inter-regionally established ties (all areas that accumulate this absence of active ties on both intra and inter-regional scales have "Laggard" and "Late-Majority" CIAPs). The Greater Lisbon-Setúbal-Peninsula axis stands out head and shoulders above all other inter-regional liaisons. The Greater-Lisbon–Greater-Porto connection, in spite of their PMS dominance[27], is composed of 11 active ties, making it only the third most representative inter-regional tie (the second one being the Greater-Porto–Cova-da-Beira link). Nevertheless, the predominance of these regions in networks of shared membership is overwhelming: connections with Greater-Lisbon account for 64.5%, links with the Setúbal-Peninsula represent 42.9%, and edges involving Greater-Porto constitute 23.8% of active ties between regions. More than 8 out of every 10 active inter-regional links presently established in Portugal involve at least one of these three regions (80.5%).

[26] Bands from the Early-Adopter areas only maintain active links with bands from Innovator and Early Majority territories; Early-Majority groups have current ties with bands from Innovator, Early-Adopter and Late-Majority regions; Late-Majority bands have no present connections with Early-Adopter and Laggard regions' bands; finally, the bands involved in local metal scenes of the Laggard areas only sustain active connections with Innovator regions (no currently shared memberships within Laggard areas).

[27] Greater-Lisbon and Greater-Porto areas are the only ones who sustain active ties with more than 10 NUTS III (16 and 13 other regions, respectively).

Regional Scale	Tie	Number of Tie	%
Within Region	Grande Lisboa	238	28,37%
Within Region	Grande Porto	100	11,92%
Inter-Regional	Grande Lisboa_Península de Setúbal	93	11,08%
Within Region	Açores	49	5,84%
Within Region	Península de Setúbal	45	5,36%
Within Region	Cova da Beira	42	5,01%
Within Region	Baixo Vouga	35	4,17%
Within Region	Oeste	28	3,34%
Inter-Regional	Cova da Beira_Grande Porto	14	1,67%
Within Region	Algarve	12	1,43%
Inter-Regional	Grande Lisboa_Grande Porto	11	1,31%
Within Region	Minho-Lima	10	1,19%
Within Region	Pinhal Litoral	9	1,07%
Inter-Regional	Cávado_Grande Porto	9	1,07%
Inter-Regional	Oeste_Pinhal Litoral	9	1,07%
Inter-Regional	Grande Lisboa_Médio Tejo	8	0,95%
Within Region	Ave	7	0,83%
Within Region	Madeira	6	0,72%
Inter-Regional	Cova da Beira_Grande Lisboa	6	0,72%
Within Region	Beira Interior Norte	6	0,72%
Inter-Regional	Alentejo Litoral_Grande Lisboa	6	0,72%
Within Region	Médio Tejo	5	0,60%
Within Region	Tâmega	5	0,60%
Inter-Regional	Baixo Vouga_Grande Lisboa	5	0,60%
Within Region	Cávado	4	0,48%
Inter-Regional	Baixo Mondego_Baixo Mondego	4	0,48%
Inter-Regional	Baixo Alentejo_Grande Lisboa	4	0,48%
Inter-Regional	Grande Lisboa_Pinhal Litoral	3	0,36%
Inter-Regional	Ave_Grande Porto	3	0,36%
Inter-Regional	Douro_Grande Porto	3	0,36%
Within Region	Alentejo Central	3	0,36%
Inter-Regional	Grande Lisboa_Minho-Lima	3	0,36%
Inter-Regional	Cávado_Douro	3	0,36%
Inter-Regional	Cávado_Cova da Beira	3	0,36%
Inter-Regional	Grande Porto_Oeste	3	0,36%
Within Region	Douro	2	0,24%
Inter-Regional	Grande Lisboa_Lezíria do Tejo	2	0,24%
Inter-Regional	Lezíria do Tejo_Lezíria do Tejo	2	0,24%
Inter-Regional	Entre Douro e Vouga_Grande Porto	2	0,24%
Inter-Regional	Grande Porto_Península de Setúbal	2	0,24%
Inter-Regional	Grande Porto_Tâmega	2	0,24%
Inter-Regional	Ave_Douro	2	0,24%
Inter-Regional	Baixo Mondego_Grande Porto	2	0,24%
Inter-Regional	Baixo Vouga_Grande Porto	2	0,24%
Inter-Regional	Beira Interior Sul_Grande Lisboa	2	0,24%
Inter-Regional	Cova da Beira_Península de Setúbal	2	0,24%
Inter-Regional	Cova da Beira_Pinhal Litoral	2	0,24%
Inter-Regional	Grande Lisboa_Pinhal Interior Sul	2	0,24%
Inter-Regional	Algarve_Grande Lisboa	1	0,12%
Inter-Regional	Grande Lisboa_Oeste	1	0,12%
Inter-Regional	Baixo Mondego_Baixo Vouga	1	0,12%
Inter-Regional	Lezíria do Tejo_Península de Setúbal	1	0,12%
Inter-Regional	Algarve_Grande Porto	1	0,12%
Within Region	Alentejo Litoral	1	0,12%
Within Region	Beira Interior Sul	1	0,12%
Inter-Regional	Baixo Vouga_Entre Douro e Vouga	1	0,12%
Inter-Regional	Grande Lisboa_Baixo Mondego	1	0,12%
Inter-Regional	Baixo Mondego_Península de Setúba	1	0,12%
Inter-Regional	Beira Interior Norte_Grande Porto	1	0,12%
Inter-Regional	Alto Alentejo_Grande Lisboa	1	0,12%
Inter-Regional	Cávado_Ave	1	0,12%
Inter-Regional	Baixo Mondego_Pinhal Interior Norte	1	0,12%
Inter-Regional	Cávado_Baixo Mondego	1	0,12%
Inter-Regional	Madeira_Ave	1	0,12%
Inter-Regional	Médio Tejo_Baixo Vouga	1	0,12%
Inter-Regional	Tâmega_Douro	1	0,12%
Inter-Regional	Tâmega_Entre Douro e Vouga	1	0,12%
		839	100,00%

Table 6 – Distribution of Active Ties (within Regions and Inter-Regional)



Map 9 – Active Ties within Regions (NUTS III)

Map 10 – Active Ties (Inter-Regional)

Network structures

For a global overview of the myriad of PMS networks, we shall focus only on active links, (shared memberships between active bands in specific time periods, excluding inactive link cases[28]). Therefore, the analysis will be set on full/complete networks (Stork & Richards, 1992) of active bands. Including only one type of vertex or node (active bands within periods) and a single type of edge or tie (shared memberships), these networks are therefore unimodal and uniplex (Hansen et al., 2011; Scott, 2000), respectively, and composed of symmetric / undirected edges.

A network structure analysis of PMS brings forth two major transformation processes: within *networks as a whole* (reflecting correlated dynamics of "*growth*" and "*differentiation*"); within their *specific groups/clusters* (reflecting simultaneous and polarized dynamics of "*macro-aggregation*" and "*micro-insularization*").

[28] For the specific purposes of this article, this basic decision presents two main advantages: it enhances the visual comprehension of graphic representations (which would be incommensurably more difficult if the past connections were included); it provides a more accurate "real picture" of concrete links in each time period, eliminating residual data relating other time periods.

Period	Number of Bands Connected to Networks	Potencial Number of Edges/ Ties	Number of Unique Edges/ Ties	Network Density	Connected Components	Modularity	Maximum Geodesic Distance (Diameter)	Average Geodesic Distance
Early 80's	5	10	4	40,0%	1	0,000	2	1,28
Mid 80's	19	171	21	12,3%	3	0,502	4	1,96
Late 80's	42	861	43	5,0%	7	0,732	6	2,72
Early 90's	125	7750	190	2,5%	14	0,726	13	4,48
Mid 90's	186	17205	306	1,8%	11	0,718	13	5,32
Late 90's	245	29890	493	1,6%	14	0,660	12	4,61
Early 2000's	333	55278	786	1,4%	18	0,640	12	4,54
Mid 2000's	447	99681	1160	1,2%	25	0,650	13	4,56
Late 2000's	578	166753	1557	0,9%	39	0,652	14	4,71
Early 2010's	661	218130	1858	0,9%	42	0,653	14	4,71
Since 2014	599	179101	1686	0,9%	39	0,650	13	4,73

Table 7 – Aggregate Networks Metrics within Time Period

Growth relates, firstly, to the sheer *size* of networks. *Table 7* shows that active networks have undergone a process of considerable size enlargement[29], from 5 (Early-80s) to 661 bands (end- of-2013). Not dwelling on critical mass theory[30] intricacies, it seems clear that the gathering of a segment of adopters/creators of metal music that was sufficient and expansive enough to provide for PMS self-sustenance and continuous growth was instrumental, especially in the 80s and 90s; PMS configuration as an almost invariably underground subfield of Portuguese rock made it a form of collective action highly sensitive to (and, to a certain extent, critically dependant of) a minimum number of adherent nodes to the networks[31].

Still relating to growth dynamics, *network-density*[32] is of paramount importance; from the 80s (when it was at its peak – 0.4, indicating that 4 out 10 possible edges were established) onwards, this particular measure displays continuous decrease[33]. Notwithstanding, denser networks in the formative years of the metal scene have been seminal to the generation of social capital, the construction of effective and aggregative reputation mechanisms (Crossley, 2009), the maximization of contexts, spaces and places of trust and cooperation, and the achievement of relatively agile, simple and efficient information, support and resources exchange circuits, globally contributing to an equilibrium between brokerage and closure within the networks, as well as to the sedimentation of a sense of identity, commitment,

[29] Exponential growth rates as high as 280% (from the Early 80s to the Mid 80s), 121% (from the Mid-80s to the Late-80s) and 198% (from the Late-80s to the Early-90s) mark the years of subfield emergence and early consolidation, and comparatively lower but steady and continuous growth since then.

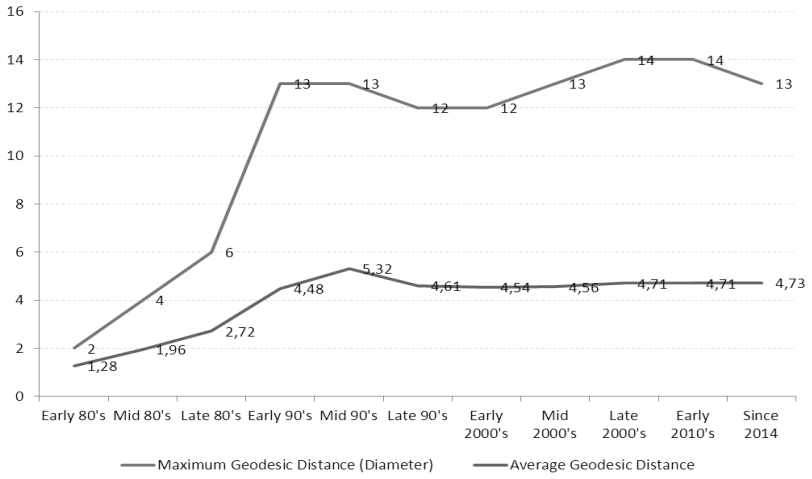
[30] Cf. Rogers, 2003; Olson, 1971; Krauth, 2011; Markus, 1987; Oliver et al., 1985; Crossley, 2007,2008a; Kim & Bearman, 1997.

[31] As Nick Crossley states: "Size is important because collective action involves 'costs' (broadly defined) which may prove prohibitive if they cannot be sufficiently distributed, and because the required work may exceed that possible for a small group. Moreover, claims to credibility and legitimacy often invoke size (would we be prepared to call a single band with three fans a 'scene' or a 'movement'?)"-(2008b: 101).

[32] An aggregate network metric used to describe the level of interconnectedness of vertices. Density counts the number of relationships observed to be present in a network divided by the total number of possible relationships that could be present – a quantitative way to capture important sociological ideas like cohesion, solidarity and membership (Hansen et al., 2011:40).

[33] Reflecting a general principle that states that densities tend to vary in inverse proportion to the size of networks or groups.

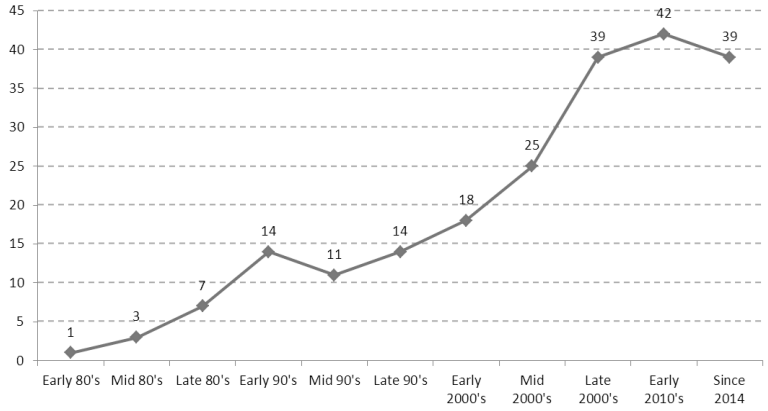
distinctiveness and autonomy, all of which indicators of subcultural substance – Hodkinson, 2002, 2004; Coleman, 1990; Burt, 2005.



Graph 11 – Diameter and Average Geodesic Distance within Time Periods

Equally relevant are distance measures: both the *diameter* (the shortest path between the two vertices that are farthest from each other, estimated by the degree - number of intermediary connections - that stands between those vertices) and the *average-geodesic-distance* among all vertex pairs display a process by which, as the whole network grows, bands tend to become less adjacent to others.

Nevertheless, the smaller diameters average geodesic distances in the 80s have been vital for the emergence, diffusion and consolidation of PMS subcultural codes, symbols, references and practices, making it easier to spread them with relative celerity and consistency and to avoid distortion and adulteration elements that often arise when longer paths between actors have to be followed (Crossley,-2008b). Both measures exponentially rise during the-90s, yet remained fairly stable since then; in spite of slight variations in diameter analogous change hasn't manifested in terms of the average distance values (unlike diameter, that recently reached a peak during the Late-2000s/Early-2010s, average distance was never as high as it was during the Mid-90s).



Graph 12 – Number of Components within Time Periods

Besides growth, *differentiation* is another main trait of PMS evolution, deriving, firstly, from an increasing number of connected *components*[34].

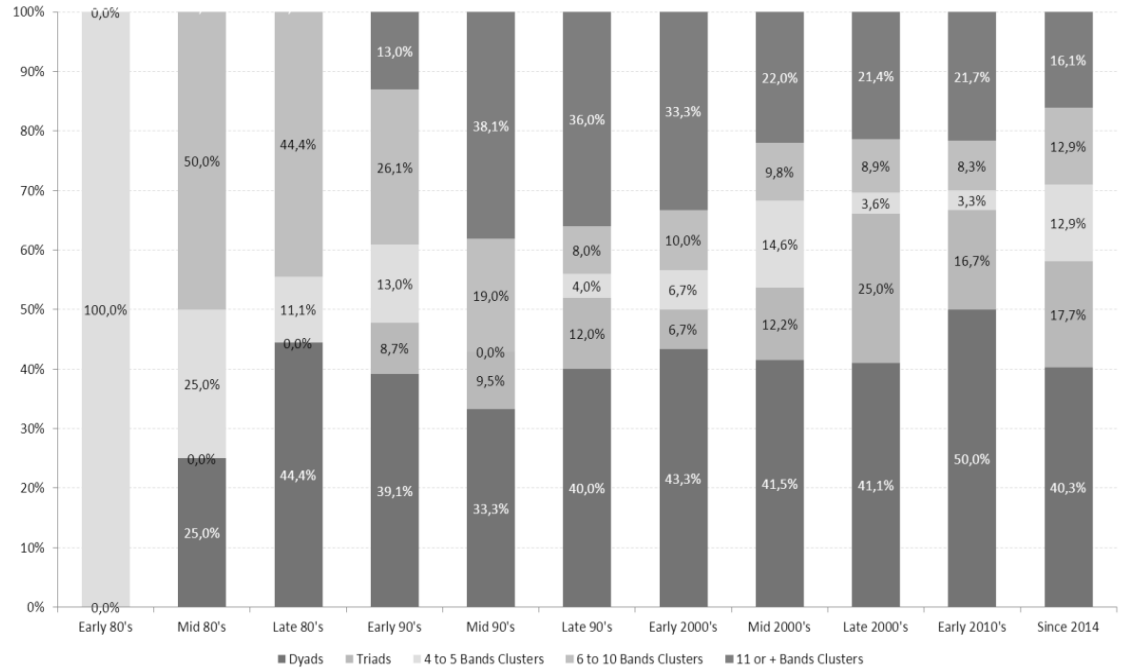
Graph 12 evidences the steady course of component multiplication, an overall rise in the number of self-sufficient and isolated clusters of shared membership, especially in the passage to the Early-90s and the last two thirds of the 2000s (in which 31.6% of the 1428 bands were founded, pointing out to a rejuvenation of the metal scene and the musicians' contingent alike, with the massive introduction of a 'new generation' of actors with limited or inexistent previous experience in previously established networks, tendentially generating new components).

Similarly, differentiation within the community structure of PMS networks concerns the emergence of densely connected clusters of bands, with much rarer tie-establishment between clusters (Danon et al., 2005; Newman, 2004).

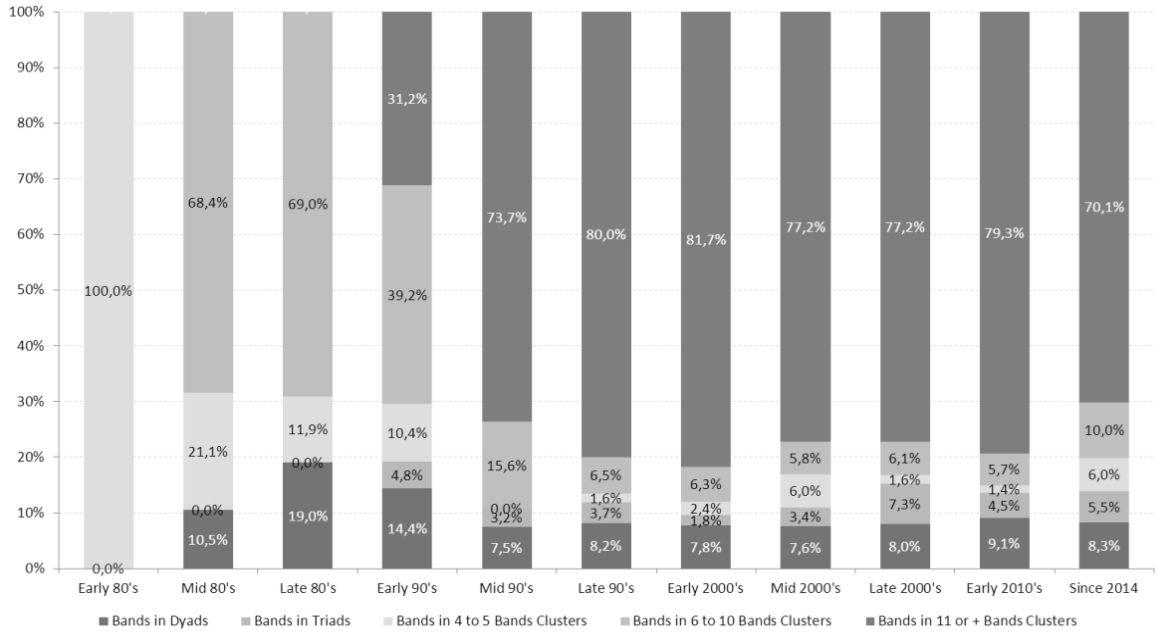
Hence, *modularity*[35] ascends uninterruptedly from the Early-80s (no modularity at all, since all bands were tied in the same component) until the Late-80s (peaking at a 0.732 value), and from then on found a pattern of slight decrease, stabilizing in values lower than 0.7 ever since the Late-90s. Modularity being a measure of the "quality" of the grouping within a network, and networks with high modularity tending to project dense connections among the nodes within the same group and sparse connections among vertices in different groups, these values are congruent with the patterns of PMS dissemination, *firstly* by establishing new, fairly autonomous and inwards-structured clusters of bands within newborn local scenes (especially in Early-Adopter and Early-Majority regions) and emerging patterns of inter-regional connections, and *afterwards*, from the Early-90s onwards, by experimenting and consolidating inter-cluster ties (a process mostly led by bands from Innovator regions), therefore compensating for the effect of component multiplication and generating a trend of modularity decrease/stabilization.

[34] A connected component is a cluster of vertices that are connected to each other but not to the rest of the graph, almost like disconnected pieces within a single network – Hansen et al., 2011.

[35] A measure of the structure of networks or graphs, designed to evaluate the strength of division of a network into modules (also called groups, clusters or communities), calculated as the fraction of the edges that fall within the given groups minus the expected such fraction if edges were distributed at random – cf. Reichardt & Bornholdt, 2006; Newman, 2006.



Graph 13 – Percentage of Groups/ Clusters by Cluster Size/ Dimension within Time Periods



Graph 14 – Percentage of Bands involved in differently sized Clusters within Time Periods

Focusing the structural analysis of PMS networks mainly on the way they are internally organized in "sub-structures" (Newman, 2006), these divisions of bands into clusters/groups/sub-structures stand out as a key-aspect of the social structuration of PMS network as a whole.

Graphs 13 and *14* emphasize the simultaneous processes of *macro-aggregation* (particular sub-networks in the metal scene become increasingly connected within their very boundaries,

having larger quantities of bands involved in them and forming an expanding diversity of community structures) and *micro-insularization* (with a growing number of small groups/clusters detached from other groups). Becoming clear that small groups of bands (dyads or triads) diachronically correspond to successively higher percentages in relation to the total number of clusters (Graph 13), representing 67% of all groups of actively shared memberships in the Early-2010s (indicating an "*insularization*" effect, i.e., the production of "islands of habitats", that allows for very small clusters of bands – mostly, newcomers or more recent bands – to develop their interchange of musicians in micro-community environments/components, insulated from larger and wider membership share circuits), Graph 14 evidences, on the other hand, that, in a macro-scale, these insulated micro-communities represent an increasingly residual parcel of active bands. Again, as a "*macro-aggregation*" effect affirms its influence, more and more bands get involved in more extended dense clusters (namely those who aggregate 11 or more bands in their ranks), regardless of their specific (central/peripheral) position within those sub-structures.

Period	Mean	Std. Deviation	Maximum Edges
Early 80's	1.60	1.34	4
Mid 80's	2.21	1.81	7
Late 80's	2.05	1.39	7
Early 90's	3.04	2.16	17
Mid 90's	3.29	3.09	23
Late 90's	4.02	4.33	29
Early 2000's	4.72	5.35	42
Mid 2000's	5.19	5.50	46
Late 2000's	5.38	5.88	51
Early 2010's	5.62	6.34	56
Since 2014	5.62	6.34	49

Table 8 – Mean, Standard-Deviation and Maximum Edges of Networks within Time Periods

The articulation of these two processes seems clear in some basic descriptive statistics. The steady rise in terms of mean degree (the number of ties established by any given band) would, if read superficially, encourage the assumption that networks have become increasingly well integrated, theoretically maximizing both the potential benefits (solidarity, resource exchange) and the potential constraints (less opportunities for brokerage, accentuation of peer-pressure and control, diminished margin for innovation, etc.). However, as standard-deviations also seem to be consistently high, and the maximum edges established within the networks associated to the several periods farther the distance between the truly highly connected bands and the large majority of others (the median degree in the Early-80s was 1, only rising up to 3 in the Early-2010s), the real impact of this dual flow of "*aggregation*" and "*insularization*" is thus felt.

Individual positions in networks

Besides the aggregate networks metrics, a distinct set of metrics focusses on individual units/actors, in terms of their positions within a network, assessing how particular vertices occupy a central or a peripheral place in it. These centrality measures (Marsden, 2002) can serve different purposes, evaluating an actor's position by comparing the total number of edges that are linked to him with the analogous degree values that characterize other actors

in the network (Degree Centrality - DC) – Bonacich (1987), by measuring how often this particular node lies on the shortest path between two other vertices (Betweenness Centrality - BC) – Freeman, 1977 -, by capturing the average distance between this actor and every other vertex in the network (Closeness Centrality - CC) –Freeman, 1979; Opsahl *et al.*, 2010, Wasserman & Faust, 1994 -, or by acknowledging that even if an actor has few connections, if these few connections are themselves very well connected, then this actor can potentially benefit from this scarce but "high-value" connections more than he would from more yet relatively disconnected nodes (Eigenvector Centrality - EC) (Hansen et al., 2011). Combining these elements, and determining its overall relative importance in networks, a PageRank[36] measure can be attained. To illustrate this, and some other topics relating the diachrony of PMS, the whole networks associated to the entire 80s decade, the Early-90s and the period since January-2014 shall be briefly discussed.

Diachronic transitions in PMS networks display the aforementioned structural traits: small and tightly-knit, *highly-densed networks* in the formative years (Graph N1), topographic diffusion and spatial differentiation (Graphs N2 and N3), *macro-aggregation* in large clusters, *micro-insularization* in small groups, *component multiplication* and *intense clusterization* (Graph N4). From the Early-90s on, most of these processes have been consolidated, fully expressing the development of increasingly complex and diversified network configurations, involving all the country's regions (in Graph N5, even the "Laggard" areas - such as Serra-da-Estrela ("Estr") and Pinhal-Interior-Sul (Pi-Int-Sul) -, enhancing the number of components, dyads and triads while simultaneously concentrating increasingly larger quantities of bands in clusters with 11 or more actors internally involved[37].

What PMS diachrony also brings is the renewal of network protagonists – emergent centralities occupied by new nodes, most of them directly connected to PMS transformations regarding the rise and fall, in popularity, of subgenre conventions.

Nonetheless, it should be stressed that, despite network complexity, diversity and polymorphism, all these dynamic processes of transformation and development have come to fruition without losing touch with the general traits laid out by the specific CIA regional positions – in fact, ever since the end of the 80s (a decade in which only the Innovator, Early-Adopter and Early-Majority regions established any ties between bands), CIA position has consistently maintained significant correlations[38] with the measures of Degree, Betweenness, Closeness and Eigenvector Centralities, as well as with PageRank, suggesting that, even amidst

[36] PageRank is a link analysis algorithm and it assigns a numerical weighting to each element of a hyperlinked set of documents, such as the World Wide Web, with the purpose of "measuring" its relative importance within the set; the same principle is here applied to the assessment of the relative importance of specific actors / nodes within a given network – cf. Grolmusz, 2012.

[37] For instance, in Graph N5, Group 1 – dark blue – presents 106 vertices and 305 unique edges, and Group 2 – light blue – accounts for 103 nodes and 386 ties.

[38] A Pearson product-moment correlation coefficient was computed to assess the relationship between the position (POS) of the different regions in the CIA and the measures of Degree (DC), Betweenness (BC), Closeness (CC), Eigenvector (EC) Centralities and PageRank (Rank), in the several time periods of metal music diffusion. To illustrate these procedures, two cases shall be presented. In the Early-90s, with n=125, there were positive correlations between POS-DC (r=0.304, p=0.001) and POS–EC (r=0.379, p=0.000) – both significant at the 0.01 level (2-tailed) -, POS–BC (r=0.208, p=0.001) - significant at the 0.05 level (2-tailed) -, and a negative correlation between POS–CC (r=-0.371, p=0.000) - significant at the 0.01 level. In the Early-2010's, with n=661, there were positive correlations, all of which significant at the 0.01 level, between POS–DC (r=0.240, p=0.000), POS–BC (r=0.119, p=0.002), POS–EC (r=0.248, p=0.000) and POS–Rank (r=0.149, p=0.000), and a negative correlation, significant at the 0.01 level, between POS–CC (r=-0.113, p=0.002).

general transformation trends that incorporate more and more translocal and inter-regional processes and dynamics, territorial precedence and accumulated subfield predominance in the Portuguese metal scene are still factors whose weight has to be reckoned with. "Elites" may vary individually in PMS networks, but they invariably come from the same dominant blocks.

Conclusion – networks: dual space(s) of "constraint" and "possibility"

We have tried, in the present article, to avoid basic theoretical antinomies relating the impact of spatial structures/variables on the diachronic evolution of PMS (not overrating them as an underlying infrastructure of the subfield itself, determining all its inertias and dynamisms; not underrating them as mere vapid representation schemes). We have essayed, additionally, to demonstrate how SNA may be useful in terms of comple(men)ting bordieusian and beckerian perspectives on "fields" and "art worlds", without aiming to replace them.

Theorized as subfield, the Portuguese Metal scene is transversed by structural inequalities and constraints, consolidated in spatiotemporal flows of field construction/expansion, especially in terms of *resources* distribution. Seen as a more cooperative "art world", it encounters a dimension of possibility *ouverture*, mainly within a beckerian vertex of *convention* flexibility and subgenre heterodoxy/innovation.

Nevertheless, the "beckerian third vertex" of networks does not provide definitive stances on the overall constraintness/openness of its evolution; nor should it, in a way, since SNA perspectives are most fruitful at pointing out empirical patterns for other middle-range approaches to interpret more thoroughly.

The global (un)connectedness of agents, while not rupturing established regional dominance exhorted by the historical epicentres of PMS, seems to, at the very least, indicate a more recent track of network democratization.

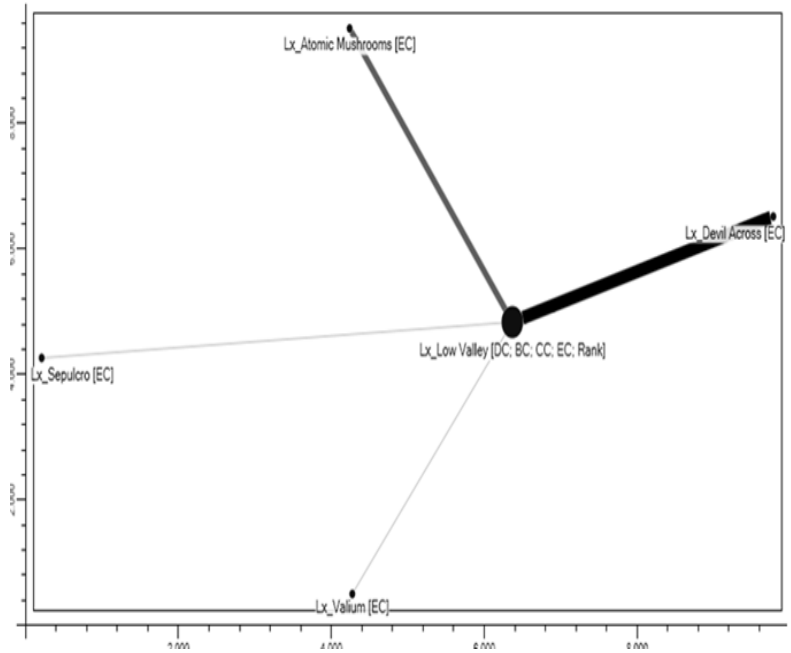
Territorialized distribution of ties reaffirms the prevalence of hegemonic physical/social locations of the subfield, imprinting a gravitational effect of network linkage towards the epicentres of resources.

Diachronic organization of Network Structure, conjugating whole-network dynamics of growth/differentiation and clustered polarization trends of macro-aggregation and micro-insularization, opens debate regarding the degree of constraint and opportunity brought forth by its evolution: while actors from traditionally peripheral locations in PMS have increased chances to participate in ever growing groups of creators, breaking previous isolation barriers, they do so mostly by partaking in them from relatively peripheral positions; whole-network and cluster protagonisms are mostly shared in elite propinquity and circularity associated to dominant physical/social spaces of PMS. On the other hand, the emergence of a growing number of (apparently) self-sufficient clusters (by agents linked to both central and peripheral regions) does not necessarily signify "subdued/ostracized isolation", as it may bear an additional "insularized" degree of agency liberty and autonomy, favouring the usage of subgenre innovation.

As for individual positions in networks, although actors autochthonous of dominant regions still concentrate in themselves a large majority of established ties (especially, "high-value" ones) and the ability to interconnect (to) other agents, a fair amount of emergent polymorphisms and clique-building processes seem to proliferate in traditionally peripheral quadrants. Moreover, "centrality"/"periphery" elements do not represent, *per se*, monolithic

(dis)advantages: "central actors" may enjoy higher degrees of influence and easiness to mobilize whole segments/clusters/components of networks (with likely increased access to central resources) but they may simultaneously experience enhanced pressure due to a much larger number of solicitations they have to attend to, as a collateral effect of their position; inversely, more "peripheral" players, although deprived of those high-levels of connected influence, can discover other types of opportunities in terms of diminished peer-pressure and the development of fresher approaches on what Portuguese metal *is* and what it *can be* (a prominent property in terms of convention negotiation). And as network centralities and peripheries maintain a relatively tight connection to physical territorialities, the analysis of their correlative ratio between constraints and possibilities should not be depleted of its particular spatial arrangements.

Our main conclusion is that, much like social and physical space, networks do make a difference in the *enjeux* and positions that (in)form the subfield. Either by stressing overall structural frameworks in which, as Hannerz (1988:6) puts it, "*the centre essentially talks, and peripheries essentially listen, without replying*", or by alternatively evidencing (otherwise opaque) spaces of possibility, subversion and transformation - compatible with Kahn-Harris's (2007) assertion that metal stands out as a translocal subculture in which local tastes and specific conditions can *interact with* and *alter* a global metal culture.

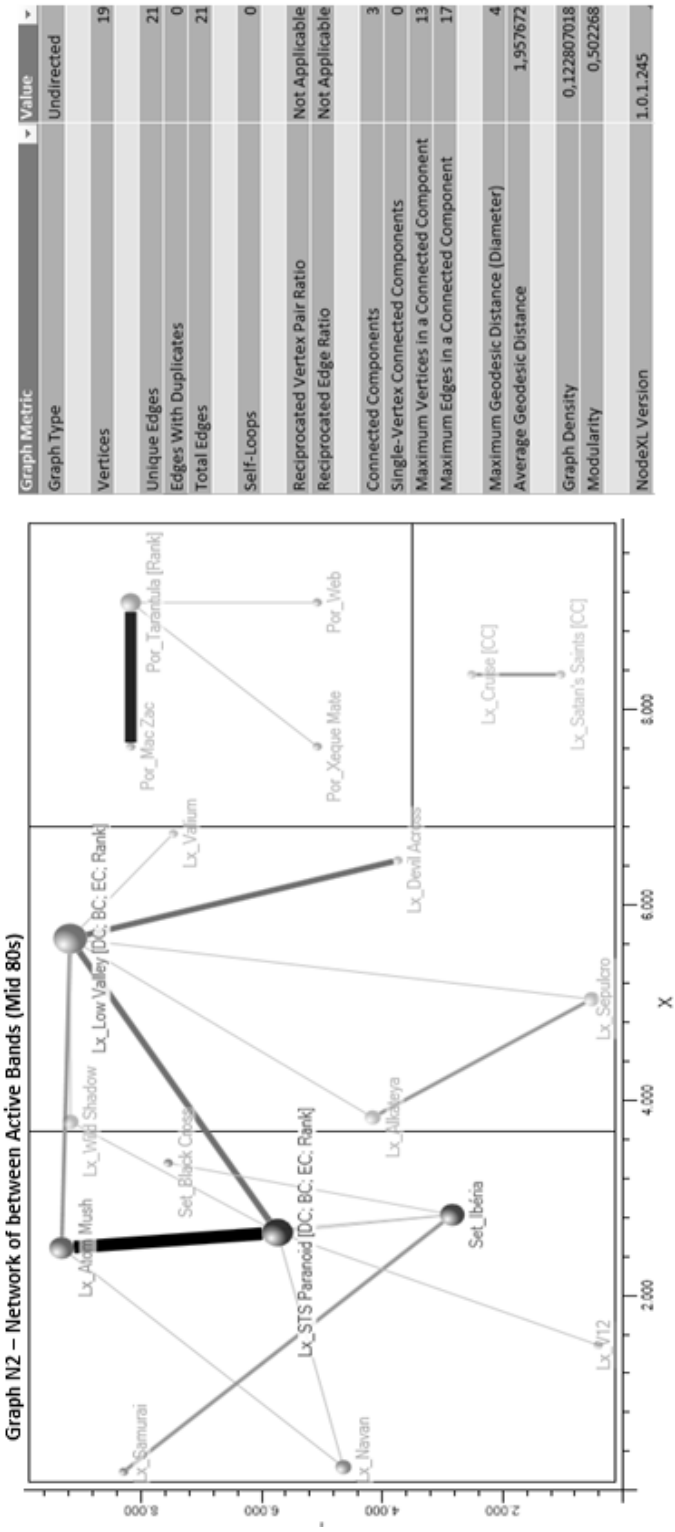


Graph Metric	Value
Graph Type	Undirected
Vertices	5
Unique Edges	4
Edges With Duplicates	0
Total Edges	4
Self-Loops	0
Reciprocated Vertex Pair Ratio	Not Applicable
Reciprocated Edge Ratio	Not Applicable
Connected Components	1
Single-Vertex Connected Components	0
Maximum Vertices in a Connected Component	5
Maximum Edges in a Connected Component	4
Maximum Geodesic Distance (Diameter)	2
Average Geodesic Distance	1,28
Graph Density	0,4
Modularity	0
NodeXL Version	1.0.1.245

Network Features:

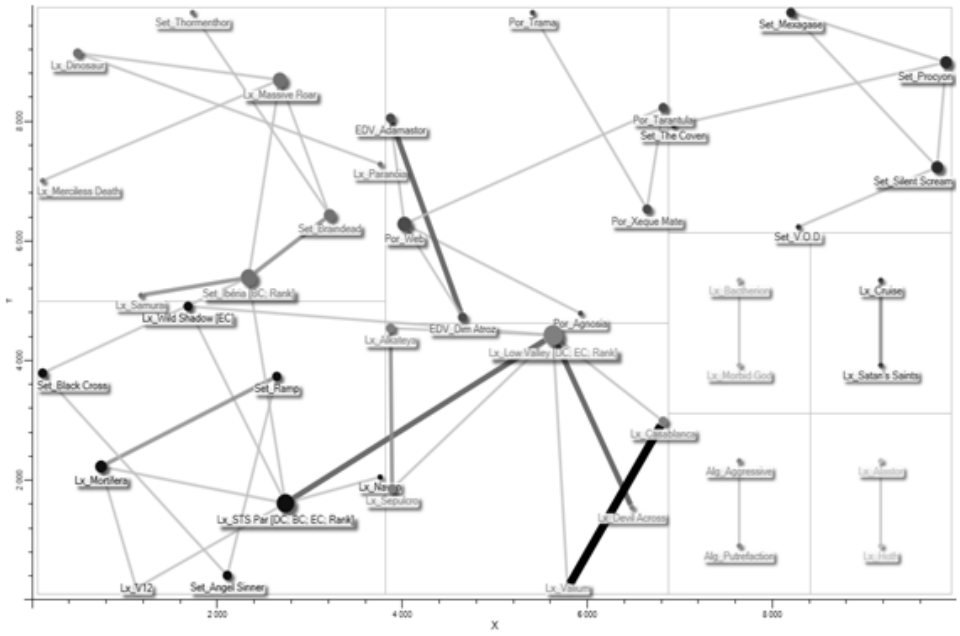
In the Early 80s, the metal network was, of course, at a very initial stage of its development, with shared membership geographically circumscribed to the Greater Lisbon (Lx) region, and only 5 bands forming it. Since there is only component (aggregating Low Valley, Devil Across, Valium, Sepulcro and Atomic Mushrooms, all of them lisbonese Heavy Metal bands – therefore, generating total internal homophily in terms of subgenres), modularity is not accounted for. In a "star network" - consisting of a central node, to which all other nodes are connected; this central node provides a common connection point for all nodes (Roberts & Wessler, 1970) -, Low Valley stands out as a central node, accumulating the highest position in terms of Degree Centrality (DC; 4 connections, in a total average of 1.60), Betweenness Centrality (BC; for 6 times, the band stands in the shortest path between pairs of other bands), Closeness Centrality (CC; 0.25 value, compared to 0.14 for all the other bands), Eigenvector Centrality (EC; in this case, all 5 bands equal at a 0.2 score), and PageRank (Rank; being the node with the highest relative importance rate – 2.38 vs. 0.65 of all the other bands – in this network)

Graph N1 – Network of between Active Bands (Early 80s)



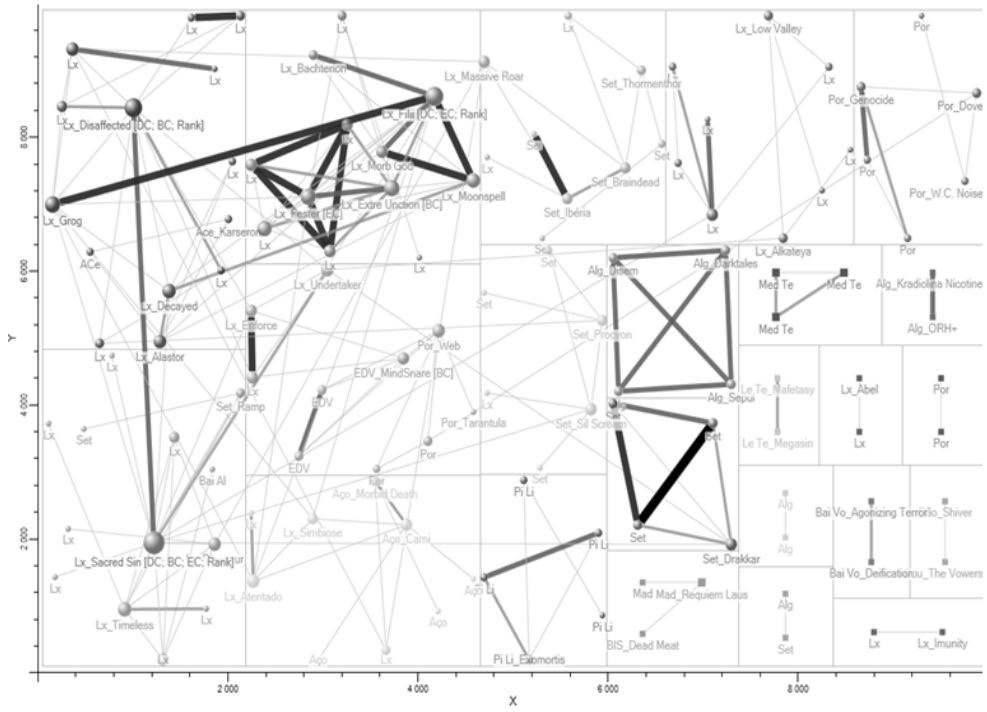
Graph Metric	Value
Graph Type	Undirected
Vertices	19
Unique Edges	21
Edges With Duplicates	0
Total Edges	21
Self-Loops	0
Reciprocated Vertex Pair Ratio	Not Applicable
Reciprocated Edge Ratio	Not Applicable
Connected Components	3
Single-Vertex Connected Components	0
Maximum Vertices in a Connected Component	13
Maximum Edges in a Connected Component	17
Maximum Geodesic Distance (Diameter)	4
Average Geodesic Distance	1,957672
Graph Density	0,122807018
Modularity	0,502268
NodeXL Version	1.0.1.245

Graph N2 – Network of between Active Bands (Mid 80s)



The Graphs are related to active networks in the Mid and Late 80s; they evidence, first of all, the topographic diffusion and differentiation of metal in Portugal – not only is there the emergence of distinct components (3 and 7, respectively) and clusters (4 and 9 groups, respectively), but also a clear spatial dissemination of the networks themselves: in the Mid 80s, even though the network only extends to the "Innovator" regions, the first autonomous sub-structure (component) outside the Greater Lisbon area arises : in the Greater Porto (Por, in the graphs) region (with Mac Zac, Tarantula, Xeque-Mate and Web, bands connected to different metal subgenres). In the capital city, new clusters of bands bring new protagonists (like STS Paranoid), the first materializations of inter-regional networks (with the inclusion of Ibéria, from the Setúbal Peninsula region –Set) and a very first autonomous dyad (formed by Lisbon's Cruise and Satan's Saints); the Late 80s deepen these trends, namely in terms of the overall presence of dyads, the appearance of local autonomous scenes in Early Adopter Regions (Algarve and Setúbal Peninsula areas), or the inclusion of bands from those regions in inter-regional networks (bands from Entre Douro e Vouga – EDV – in Greater Porto dominated networks). Low Valley and STS Paranoid maintain the highest centrality values.

Graph N3 – Network of between Active Bands (Late 80s)

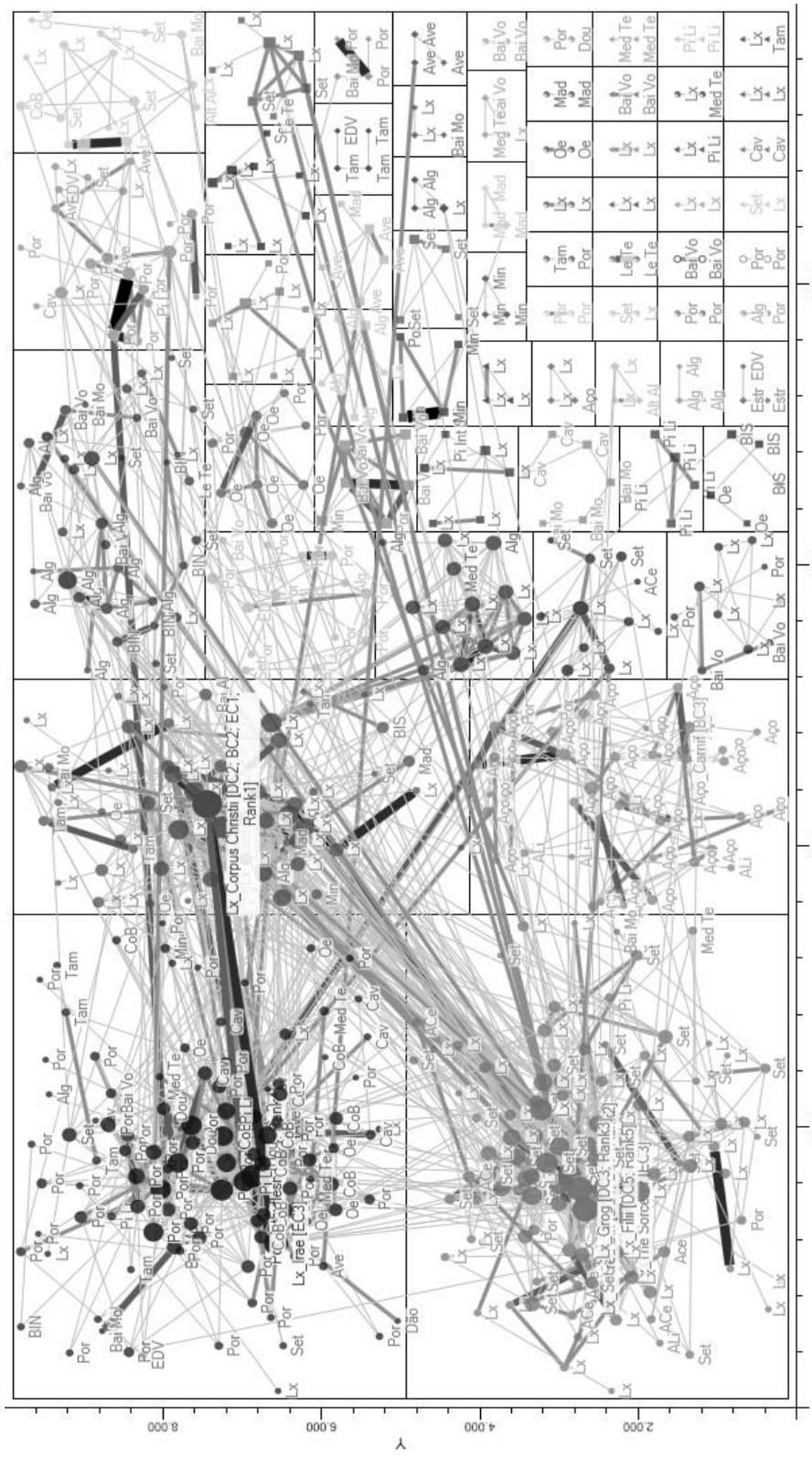


Graph Metric	Value
Graph Type	Undirected
Vertices	125
Unique Edges	190
Edges With Duplicates	0
Total Edges	190
Self-Loops	0
Reciprocated Vertex Pair Ratio	Not Applicable
Reciprocated Edge Ratio	Not Applicable
Connected Components	14
Single-Vertex Connected Components	0
Maximum Vertices in a Connected Component	92
Maximum Edges in a Connected Component	165
Maximum Geodesic Distance (Diameter)	13
Average Geodesic Distance	4,483
Graph Density	0,024516129
Modularity	0,725803
NodeXL Version	1.0.1.245

Network Features:

The Early 90s (Graph N4) stretch the trends of cross-regional membership share, involving bands pertaining to the Early and Late Majority in local and translocal networks, enhancing an early "macro-aggregation" effect in and around the most prominent clusters and their cliques (along with a notorious growth in their size), diversifying the subgenre cross-pollination in and between groups of bands, introducing the first autonomous triads, increasing the number of dyads (pointing out to the process of "micro-scale insularization"), surpassing the borders of Continental Portugal (with the inclusion of Madeira and Azores bands in specific clusters) and creating centrality dominance around newcomer protagonists, many of them connected to the emergent and so-called "extreme" (Kahn-Harris, 2007) subgenres (mostly Black Metal, Death Metal or Grindcore). The first autonomous four-nodes cliques are formed in the Algarve and Setúbal Peninsula regions (Early Adopters), and, in the form of triad, in Médio-Tejo (an Early Majority region). The number of connected components has a significant rise (doubling it, when compared to the previous period). Sacred Sin (Lx) [DC; BC; EC; Rank], Filii Nigrantium Infernalium (Lx) [DC; EC; Rank], Disaffected (Lx) [DC; BC; Rank]; Extreme Unction (Lx) [BC], and MindSnare (Entre Douro e Vouga) [BC] stand out as new protagonists in terms of networks centralities.

Graph N4 – Network of between Active Bands (Early 90s)



Legend: ACe (Alentejo Central); Aço (Azores Autonomous Region); Alg (Algarve); ALi (Alentejo Litoral); Alt Al (Alto Alentejo); Alt Tra (Alto Trás-os-Montes); Ave (Ave); Bai Al (Baixo Alentejo); Bai Mo (Baixo Mondego); Bai Vo (Baixo Vouga); BIN (Beira Interior Norte); BIS (Beira Interior Sul); Cav (Cávado); CoB (Cova da Beira); Dão (Dão-Lafões); Dou (Douro); EDV (Entre Douro e Vouga); Estr (Serra da Estrela); Le Te (Lezíria do Tejo); Lx (Greater Lisbon); Mad (Madeira Autonomous Region); Med Te (Médio Tejo); Min (Minho-Lima); Oe (Oeste); Pi Int Nor (Pinhal Interior Norte); Pi Int Sul (Pinhal Interior Sul); Pi Li (Pinhal Litoral); Por (Greater Porto); Set (Setúbal Peninsula); Tam (Tâmega).

Graph N5 – Network of between Active Bands (since 2014)

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