

Embedded performers: The relational foundations of record production

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ABSTRACT

This article discusses some network mechanisms that may facilitate involvement in artistic production. More specifically, it explores the nature of the collaborative networks in which musicians are embedded, and looks for the structural configurations that are most conducive to individual creativity. Drawing upon a dataset consisting of 253 music teachers in the Italian region of Trentino, and focusing in particular on record production, the article shows productivity and artistic vitality to be highest among musicians with a balanced combination of ties to other musicians in the local music schools system, and ties to musicians with different territorial locations. These findings contribute to established lines of research on the network determinants of individual productivity and creativity in various domains.

1. Embedded performers: the relational foundation of record production

It has long been recognized that music, as well as artistic production in general, is rarely – possibly, never – the pure outcome of isolated genial characters. To the contrary, it is mainly a social process which happens across complementary fields, from music education to creation, production, commercialization and consumption, and involves a multiplicity of actors ranging from (professional as well as amateur) performers, composers, or music teachers to audiences, engineers, commercial and support staff (see, among many others, Becker, 1982; Finnegan, 1998). Attempts to emphasize the social dimension of music and its interactive nature have also resulted in a linguistic shift, with some even replacing “music” with “musicking” (Small, 1998). The latter is meant to better capture the nature of music as a set of practices rather than an entity with ontological properties (on music ontology: Davies, 1991). In particular, musicking has been identified as a social practice consisting of innumerable interactions, located in hugely diverse social settings (Crossley, 2020).

Researchers interested in the relational and structural dimensions of music making have increasingly relied on network analytic tools to systematically explore those mechanisms and their implications (Crossley, 2015; Phillips, 2011). In this article we intend to contribute to this line of inquiry. We do so through the analysis of how musicians’ artistic practice – in particular, record production – is affected by their embeddedness in specific institutional and relational settings. Our case study consists of 253 professional music teachers active in 12 music

schools in Trentino, a region in the Italian North East. We address in particular three questions, concerning how record production is impacted by:

1. the position of musicians in the professional system in which they operate;
2. the prevailing relational patterns within the schools to which music teachers are contracted;
3. the distribution of musicians’ strongest collaborative ties between local and external contacts.

In exploring these issues we rely primarily on two main lines of research and theorizing. One is solidly rooted in sociological and organizational approaches to the embeddedness of social action (see in particular Granovetter, 1973; Burt, 2005). The other one is much more recent and less established, and locates our investigation into a broader quest for the mechanisms that secure the vitality of individuals and/or collectivities (Lavrusheva, 2020). By vitality we mean “the ability of an actor or collectivity of actors to put in place a series of actions that reflect their creativeness and are consistent with self and other actualizing outcomes. Such actions – through appropriate processes – reflect positive self and other-regarding values” (Sacchetti, 2022). This concept is functional to our view of artistic production as defined in terms of self-expression rather than in commercial, profit-maximizing terms.

The paper develops as follows. In the first section we identify key theoretical approaches to the study of the relationship between networks, productivity and innovation in a variety of organizational

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settings. On that basis, we advance some hypotheses in specific reference to musical practice. The second section illustrates the features of our unit of analysis, looking at both individual and structural properties. In the third section we run a set of negative binomial regressions to test some models accounting for music teachers' record production. The paper closes with a discussion of the main results. We show in particular that artistic productivity is higher among musicians whose collaborations are evenly split between fellow artists operating in the same local system, and artists located in other contexts.

2. Networks and artistic creativity: some hypotheses

The relationship between networks, creativity and innovation has been repeatedly explored, mostly although not exclusively in reference to business-oriented organizational performance and market-oriented innovation. Oftentimes the focus has been on the link between networks and individual performance (for a review: [Perry-Smith and Mannucci, 2015](#)); other times, on the role of creative networks in fostering innovation and economic performance in specific settings, for example, “creative cities” (for a review: [Rodrigues and Franco, 2020](#)). While some studies have pointed at the importance of strong, dense ties as “effective catalysts for the generation of creative ideas” ([Sosa, 2011](#), p. 1), most analysts have looked at innovation and creativity as strongly dependent on the heterogeneity and diffuseness of individual networks rather than their density. For example, focusing on intellectual movements, and most specifically the emergence of challenges to Freudian orthodoxy within psychoanalysis, [McLaughlin \(2001\)](#) has spoken of “optimal marginality” in order to challenge two polarized views of intellectual innovation: the one that associates influence with central location in institutional and professional networks, and the romantic one of the innovator as a marginal, isolated character. His distinction between “optimal” and “suboptimal” marginality, the former implying the ability to connect to the core networks of a discipline without being fully embedded in it, explicitly refers to [Granovetter \(1973\)](#) classic argument about the opportunities offered by dispersed over densely-knit relational patterns ([McLaughlin, 2001](#), p. 281). Organizational research has also suggested that “individuals who occupy an intermediate position between the core and the periphery of their social system are in a privileged position to achieve creative results. This position allows them to maintain exposure to alternative sources of inspirations and novel ideas that lie on the fringe of their social system, but without being disconnected from the base of legitimacy and support that is associated with the core and is required to implement those ideas and gain the visibility necessary for them to be recognized as valuable in a given context” ([Cattani and Ferriani, 2008](#), p. 825).

This particular configuration of relational patterns is also central to the exploration of the mechanisms behind the vitality of both individuals and the system in which they are embedded. The notion of vitality combines self-actualization with creativeness, borrowing from organizational psychology (as in seminal work by [Maslow, 1963](#)). According to this view, vital artists – in our case, musicians – would be those who engage in something creative while enjoying what they are doing ([Sacchetti, 2022](#)). Most definitions of creativity place emphasis on the cognitive process, on the ability to generate something new and useful ([Amabile, 1988](#); [de Vaan et al., 2015](#); [George, 2007](#)) and, in business, on how this translates into innovation and the generation of greater competitiveness and market value (*ibid.*). Creativity, in line with [Maslow \(1963\)](#), is expressed when persons have the capabilities and persistence to actually realize an initial intuition that is new for them (and not necessarily for the world or the sector, and not necessarily conducive to a marketable product) without having necessarily a business outcome or a major relevance for the sorts of society. [Follett \(1998\)](#), echoing Dewey and pragmatist thinkers, called for greater creativity through diversity, recognizing that complexity and diversity can generate solutions rather than being the source of problems ([Nelson, 2017](#)). The implications for relational choices are neat: greater creativity

can be further expressed when people have the possibility and ability to increase diversity of contacts, activities and like what they do. Accordingly, a combination of internal and external ties facilitates the emergence of vital organizational arrangements. On the one hand, vital working units are cohesive enough to enhance mechanisms of mutual dependence ([Sacchetti and Sugden, 2009](#)), and imply mutual support as well as shared rules and control mechanisms ([Sacchetti and Tortia, 2020](#)). At the same time, they are also sufficiently connected to other milieus to prevent too rigid mechanisms of “lock-in”, such as complacency, self-reproduction, reluctance to explore new paths ([Sacchetti, 2022](#)).

The lines of thinking presented above are also relevant for the analysis of the mechanisms behind musical production. It is certainly plausible to suggest that the most conducive networks to musical productivity might be those with a balanced¹ presence of local and trans-local ties. In other words, daily face-to-face interactions with musicians operating in the same environment may provide people with a sense of belongingness in an artistic community; they may also generate mechanisms of mutual support and competition, as well as of positive influence and emulation, that may drive people to engage in musical production. At the same time, an exclusive reliance on local, densely-knitted ties may also engender mechanisms of complacency and self-referentiality corresponding to a situation of lock-in, in which musicians lack the innovative ideas and the exposure to broader sets of experiences that might ultimately encourage production. In laying out our main hypotheses we will focus on how different contributions elaborate on this broad idea, namely, how they approach the combination of local embeddedness and external outreach. In particular, we'll look at how such combination plays out in reference to the position of individuals within their professional environment (H1); the overall flow of connections which characterizes the organizations to which musicians are contracted (H2); the volume and distribution between local and external partners of each teacher's most important collaborative ties (H3–H5).

First of all, the argument about the importance of a balanced involvement in local and external ties may be articulated in reference to musicians' position within a larger core-periphery structure. For example, teams of creators of Broadway musicals have been found to be most effective when they combined elements of cohesiveness and continuity over time with the ability to reach out to other creative teams or independent artists ([Uzzi and Spiro, 2005](#)). Looking at another artistic field, an exploration of the relational mechanisms behind individual success in the Hungarian movie industry has suggested that chances to achieve creative success are higher if creators “belong to the network core and bridge the core to the periphery at the same time. This core and broker position in the network support creative success by providing complementary benefits for central creators” ([Juhász et al., 2020](#), p. 11). Following insight from these studies we can expect that:

H1. Musical production will be higher for musicians that occupy an intermediate position between core and periphery in their professional environment.

Another version of the same argument could take into account how individual relational patterns combine in shaping the overall connectivity of the organizations to which teachers are contracted; and how, in turn, such organizational profile may affect individual performance. Looking at the proportion of ties linking the members of a team/working unit to each other and to external actors, some have suggested that a combination of density and reach might facilitate organizational performance ([Reagans and Zuckerman, 2001](#)). The most influential formulation of this argument has probably been Ronald Burt's (2005). In

¹ It is worth stressing that throughout this piece we use the term “balance” in the sense of ordinary language, not balance theory. Accordingly, by “balanced” distribution of ties for individuals we mean a relatively similar amount of connections to artists in their local milieus and in other settings.

the context of his broader exploration of structural holes and brokerage roles, Burt showed performance to be highest for groups that combine high levels of internal cohesion and closure with high brokerage capacity; and lowest for units that display neither (Burt, 2005, p. 139). We may build on this idea by suggesting that the dominant relational patterns within a school may affect its teachers' performance, regardless of the specific amount of ties that they are embedded in as individuals. Even musicians who are not particularly connected might increase their motivations and opportunities to engage in some recording if their colleagues were densely involved in in-house as well as external collaborations; conversely, even well-connected musicians might see their chances of engaging in record production reduced, if contracted to a school whose teachers are mostly isolated. Accordingly, we propose that.

H2a. Musical production will be highest for musicians contracted to schools where on the aggregate teachers hold a balanced combination of internal and external ties;.

H2b. Musical production will be lowest for musicians contracted to schools where on the aggregate teachers are poorly connected both internally, and to other musical milieus.

Hypotheses 1 and 2 relate individual musical productivity to the properties of the relational systems in which musicians are embedded: the network of fellow musicians (H1) and the school to which they are contracted (H2). It is also possible, however, to focus on some properties of musicians' egonetworks, in particular, their volume and their composition in terms of local vs. external ties. In the first place, we may expect record production to be correlated to the volume of collaborative ties in which each musician is involved. One should note that collaborations are not necessarily linked to record production. People may collaborate in the context of gigs and concerts, they may jointly contribute to theater shows and other instances of performative arts, or cooperate in music education, or jointly conduct bands and ensembles. The ties forged in all these settings may provide the incentives to engage in record production, but may also work positively against them. For example, some musicians may assign much greater value to live performance over music composing or recording (Finnegan, 1998, chap. 3). Still, it is plausible to assume that musicians with a high volume of collaborative ties be more likely to find the incentives and opportunities to also engage in record production:

H3. Musical production will be positively correlated to the overall volume of collaborative ties in which music teachers are involved.

At the same time, we should also take into account the possibility that not only the volume of collaborators matters, but also their composition. Granovetter (1973) well-known argument about the importance of ties that reach beyond one's immediate environment might well apply to music teachers. The more they collaborate with musicians external to their local environment, the more one could expect them to receive new ideas, technical and emotional support, which might lead to a more active involvement in musicking, and more specifically in record production. The following hypothesis ensues:

H4. Musical production will be positively correlated to the volume of collaborative ties that musicians have outside their local context/regular working environment.

However, as the literature we have already discussed suggests (Burt, 2005; Juhász et al., 2020; Uzzi and Spiro, 2005), the spatial distribution of the ties in which people are involved also matters. While a significant amount of collaborative ties to other artistic milieus can be expected to bring vitality into a local artistic community, an exclusive involvement in ties disconnected from the context in which one regularly operates might lead to isolation and ultimately lack of motivation in one's daily practices. Our final hypothesis then reads:

H5. Musical production will be higher for musicians that may rely on a

balanced combination of external connections and ties to their local professional environment.

3. Methods and context

The data to test our specific hypotheses come from the personal information that music teachers posted on the website of their schools. Of the 13 schools part of the Trentino music school system (henceforth, TMS), one did not have any information on its website. Its teachers are therefore not included in the current dataset, that consists of 253 musicians, out of an estimated total of 300. Table 1 below reports their distribution, alongside some basic information on the schools.

The project also relied on other data sources. Alongside the exploration of individual web pages we also conducted an anonymous survey, to which 140 teachers contributed, as well as 50 qualitative interviews (Sacchetti, 2023). Some insights from the teacher survey and the interviews can help to define the context of our analysis and its peculiarities, consistently with the nature of music as a social process. Most network studies of artistic performance have focused on professional musicians aspiring to play a role in the music system: e.g., Broadway musicals (Uzzi and Spiro, 2005), or the international jazz community (Phillips, 2011). However, musical creativity is not necessarily restricted to those figures. It can be found among purely amateur musicians, or musicians that combine artistic and activist roles, or artists operating on the border between professional and voluntary activity (see e.g. Dalla Chiesa and Dekker, 2021; Finnegan, 1998; Reitsamer and Prokop, 2018). In our specific case, we explore musical production among musicians who mostly operate professionally as teachers, taking roles for which artistic production is not necessarily expected. This entails looking at more diversified and less glamorous forms of production than major record labels or Broadway shows – these include records for low profile labels, recordings made by teachers of a school as a form of promoting its activities, or records with educational purposes. While they are not necessarily oriented to the core artistic market, those forms of artistic production contribute nonetheless to the vitality of the specific cultural and social system in which artists are embedded.

It is plausible to assume that, barring some superstars, the majority of musicians have to engage in some form of teaching in order to make ends meet. However, in this paper we focus on a specific subgroup of music teachers, namely, teachers who are contracted to one of the thirteen music schools that make up the Trentino system of music education. These schools are not public entities like music high schools (Licei Musicali) or conservatories; rather, they are either worker cooperatives or non-profit associations. Conditional upon subscribing to a shared educational program, these schools have access to generous public funding (almost six million euros per year overall) which enables them to attract thousands of students at much reduced costs. The implication in terms of artistic productivity is that music teachers in those schools are, by their role, primarily teachers rather than musicians. Their main

Table 1
Trentino music schools and their teachers.

School	Locality	Established (year)	Teachers (N)	% Male
CDM	Rovereto	1987	22	77%
Diapason	Trento	1989	24	50%
Eccher	Cles	1986	31	61%
Minipolifonici	Trento	1981	21	62%
Moser	Pergine	1975	19	47%
Novak	Villa Lagarina	1985	20	40%
Opera Prima	Ala	1993	15	67%
Pentagramma	Tesero	1983	25	68%
Primiero	Tonadico	1995	15	67%
SMAG	Riva del Garda	1995	31	71%
SMG	Tione	1983	23	70%
Zandonai	Rovereto	1889	7	43%
Total			253	62%

goal is not to produce records, to the contrary, their primary activity might even positively discourage them from engaging in record production: the characteristics of their main (and regular) source of income are such that the incentive to concentrate exclusively on teaching is very high (Sacchetti and Marchesin, 2020).

It is in reference to this particular system that we'll explore how relational mechanisms may contribute to teachers' persistent commitment to artistic production and ultimately to their artistic vitality. Generally speaking, schools are not regarded as a particularly stimulating environment by teachers. When asked in the survey whether they considered their school as an inspiring and energizing environment, teachers' reply was quite lukewarm (the average score being 4.68 over a seven points scale of agreement). Some teachers may hence choose to keep a part-time collaboration with their school to have more time to dedicate to their artistic practice. Excerpts from qualitative interviews illustrate this point:

"If you find the right balance, being an artist helps the teaching so much. This is an element that over the years I find indispensable... it always allows you to work and not stand still on a form of research that, in the end, is really useful for improving the teaching aspects as well." (Diego, February 2022)

"Teaching-only? in my case I would say no! I would become "grey", in the sense that I would not have this energy that I also take from the other [artistic] side. [...] For me this is what it is, absolutely. Because I would be dead otherwise." (Daniela, February 2022)

At the same time, not all teachers come to the profession having been performers; some may come to the profession directly as educators. Previous research supports the existence of this double socialization channel for teachers (see Beynon, 1998 among others). Even among those who came to teaching from performance, not all have succeeded in balancing the two activities (teaching and playing). As a full-time contract implies 19 hours of teaching per week, mostly in the afternoons and evenings, performances are reduced to school vacation and week-ends, or abandoned. Drawing from survey data, we know that, on average, teaching occupies 61 hours per month (Sacchetti, 2023). Some however choose teaching because they may adapt their teaching schedule to their overall preferences. A teacher explains:

"[...] you make choices; the moment you accept a contract from part time to full time you know you have to give something up otherwise it would be too good, wouldn't it? We usually have four busy days so if I can arrange it, I'll go and play on the other days" (John, February 2022)

From the interaction between teaching and musicking emphasized by these extracts, it should be clearer that record production, on which we focus in what follows, is just one way in which vitality can be expressed and one form of what we name artistic activity. It is important to acknowledge the limitations of our approach: since we focus on vitality as the attitude to generate activities that are new for persons and make them fulfilled, a focus on the artistic sphere and, in particular, on record production of music teachers is no doubts restrictive of all the possibilities that they have to be vital. However, record production represents an observable and objective indicator (a) of the artistic component of a musician's activities, (b) of their actual capability to translate artistic intuitions in projects that can make them fulfilled in some respects (otherwise we would think that they would not engage in the recording project), and (c) of their connection with the community of musicians since record production requires the participation of a plurality of actors.

3.1. Dependent variable

Our dependent variable consists of the number of record productions that were detected through a systematic search of five major online

databases: Amazon Music, You Tube Music, Spotify, Apple Music, and Discogs. Altogether we identified 386 productions, of which 62 were by a single musician; the remaining 324 entailed collaborations with other musicians. Details of each production were checked by one member of the research team to make sure to avoid cases of homonymy. On average, teachers had between one and two productions (mean 1.53), but half of them (127 out of 253) were not associated with any productions. There was also substantial variance across schools in the number of teachers that had actually participated in record productions (Table 2). CDM and Eccher schools had a particularly high percentage of teachers with at least one production to their credit. Considering the production concentration index (CI), i.e. the share on the total volume of productions made by teachers in each school, the first school produced a quarter of the total productions, the second a fifth, and the third just over a tenth. Two-thirds of the total productions (65%) were concentrated in the first four schools: CDM, Smag, Diapason and Pentagramma. In contrast, the Novak and Zandonai schools were well below the average in terms of their teachers' productivity.

3.2. Independent variables

In order to explore the network position of individual musicians we looked at two different types of connections. First we looked at the compound network, combining multiple levels of interaction within the TMS system. Data were elicited from a series of 2-mode matrices in which musicians indicated their involvement in specific activities. These consisted of (a) collaborations in educational projects; (b) joint involvement as conductors, musical directors or performers in musical ensembles; (c) joint presence at festivals and other cultural events. The resulting network displays a clear core-periphery structure (Fig. 1). In order to test hypothesis 1, that the most productive musicians would be those located in an intermediate position within such structure, we calculated the coreness score² as well as some standard measures of centrality: degree, eigenvector, betweenness and closeness (Table 3). Consistently with our expectations, for each measure we modelled the expected relationship with productivity as a quadratic function (see Tables 6–8).

The other main independent relational variable for our analysis (hypotheses 2–5) consisted of the number of collaborations to other musicians that teachers indicated in their official webpages. Like the ties mentioned above, they covered in principle a range of activities much broader than recordings, including live performances, contributions to shows, educational activities outside their own school, etc. They differed, however, in the importance that artists attributed to them by explicitly mentioning them in their websites. In the average, TMS teachers mentioned 3.4 important collaborations, of which 2.8 to musicians outside the system, the rest to other members. In contrast to the compound network illustrated above, the network of strong collaborations between TMS musicians was highly fragmented³ (Fig. 2). On the other hand, being based on information provided directly from the musicians, it was possible to measure to what extent each individual combined ties to other musicians in the local system with ties to musicians working elsewhere. To this purpose we used the E-I index (Krackhardt and Stern, 1988), that measures the amount of heterophily or homophily in one's network.⁴ One disadvantage of the E-I index is that it cannot be computed for nodes of the network that are not involved in any tie (the denominator in that case would be 0). This

² "Coreness" measures the distance of each node from the center of the network in an Euclidean space (Borgatti and Everett, 2000, p. 387). It was computed with the continuous core-periphery module in Ucinet.

³ The fragmentation of this network makes it unsuitable to test the core-periphery hypothesis (H1).

⁴ An alternative measure like Yule's Q is not "computable in data collected via a personal-network design" (Borgatti et al., 2013, p. 274).

Table 2
Record production across music schools.

School	Active teachers		Total teachers	Average productions per teacher	Total productions per school		Sum
	N	%			N	%	
CDM	16	73	22	4,45	98	25%	25%
SMAG	15	48	31	2,26	70	18%	43%
Diapason	12	50	24	2,04	48	12%	55%
Pentagramma	14	40	25	1,56	40	10%	65%
SMG	11	48	23	1,09	25	6%	71%
Eccher	19	61	31	0,74	23	6%	77%
Minipolifonici	9	43	21	1	21	5%	82%
Opera Prima	6	40	15	1,2	18	5%	87%
Moser	8	42	19	0,79	15	4%	91%
Primiero	8	53	15	1	15	4%	95%
Novak	6	30	20	0,5	10	3%	98%
Zandonai	2	29	7	0,43	3	1%	99%
Total	126	50	253	1,53	386	100%	

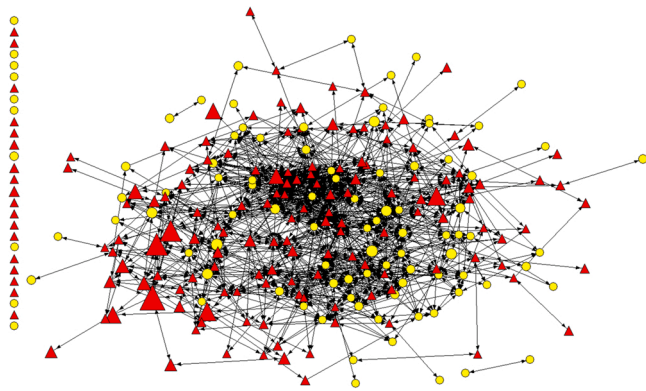


Fig. 1. Compound network of musicians in the TMS system (yellow circles: female teachers; red triangles: male teachers; node size proportional to number of recordings).

Table 3
Variables in the analyses.

Variable	Obs	Mean	S.D.	Min	Max
Number of record productions	253	1,53	3,13	0	24
Gender (1 =male)	253	0,62	0,49	0	1
Singing teacher	253	0,07	0,25	0	1
Choir teacher	253	0,09	0,29	0	1
Basic music education for children	253	0,08	0,27	0	1
Coreness in local compound network	253	0,02	0,06	0	0,39
Degree in local compound network	253	9,75	9,69	0	43
Betweenness in local compound network	253	18,26	264,31	0	1423,79
Eigenvector in local compound network	253	0,15	0,25	-3,40E-15	1
Closeness in local compound network	253	1031,19	388,76	711	2016
High performance expected (Burt, 2005)	253	0,38	0,49	0	1
Low performance expected (Burt, 2005)	253	0,27	0,44	0	1
Most important collaborators	253	3,38	6,56	0	52
E-I index (collaborators)	171	0,33	0,72	-1	1

would reduce the number of valid cases from 253 to 139. As a partial correction to this, we assigned a value corresponding to the mean of E-I (.33) to those cases in which a record production implying collaboration with other musicians (mostly ensembles) was detected, yet without

Table 4
Collaborations to musicians within and outside the Trento system.

School	Within TMS	Outside TMS	Total	N
CDM	1,41	10,05	11,45	22
Diapason	0,79	2,63	3,42	24
Eccher	0,68	1,10	1,77	31
Minipolif	1,05	4,38	5,43	21
Moser	0,16	1,74	1,89	19
Novak	0,25	1,60	1,85	20
Opera Pri	0,13	0,53	0,67	15
Pentagram	0,60	1,68	2,28	25
Primiero	0,20	1,53	1,73	15
SMAG	0,65	2,39	3,03	31
SMG	0,43	2,74	3,17	23
Zandonai	0,14	2,57	2,71	7
Total	0,60	2,78	3,38	253

Table 5
Schools' strength of collaborative ties within and outside the TMS system.

	Strength of ties within system	
	Below the median	Above the median
Above the median	SMG; Zandonai	CDM; Diapason; SMAG; Minipolifonici
Strength of ties outside system		
Below the median	Moser; Opera Prima; Novak; Primiero	Eccher; Pentagramma

enough details to ascertain collaborators' location (see Table 3).

The source of our data being musicians' websites means that we were seriously limited in our range of control variables. We could however take musicians' gender into account, with slightly less than two thirds of the population being males. We also included involvement in a number of teaching activities that see a predominant presence of female musicians, such as coral activity (62% of female teachers in that area as opposed to 38% of females among all teachers), singing (82% female teachers), and children introductory musical education (80% female teachers).

Finally, in order to test H2 we needed to build a profile of each school in terms of its teachers' involvement in collaborations within and outside the Trento educational system. They differed substantially in this regard (Table 4). In order to identify organizational environments which may be expected to be more or less conducive to individual artistic performance we classified the different schools depending on whether they were above or below the median amount of both internal

Table 6

Correlations between independent variables.

	gender	singing teaching	choir teaching	children education	coreness	degree	closeness	high efficacy	low efficacy	collaborations	EI index
gender	1,00										
singing teaching	-0.3007	1,00									
choir teaching	-0.3267	0.2667	1,00								
children education	-0.1983	0.1946	0.2079	1							
coreness	-0.0673	-0.0403	0.0032	0.0058	1						
degree	-0.0093	-0.0265	0.1199	0.0885	-0.0080	1					
closeness	-0.0475	0.0492	-0.0884	0.0073	0.1299	-0.5341	1				
high efficacy	0.0274	-0.0212	-0.0488	0.0661	0.0705	0.0324	-0.0904	1			
low efficacy	0.0166	0.0684	0.1389	0.0400	-0.0775	-0.1305	0.1468	-0.4404	1		
collaborations	0.1106	-0.0089	-0.0615	-0.0032	-0.0090	0.0132	-0.0443	0.2898	-0.1369	1	
EI index	-0.0360	-0.0164	0.0268	0.0117	0.0926	-0.0980	0.1890	0.0559	0.0966	0.2967	1

Table 7

Negative binomial regression of individual record production over independent variables.

	Model 1 (standard)	Model 2 (bootstrap)	Model 3 (standard)	Model 4 (bootstrap)	Model 5 (standard)	Model 6 (bootstrap)
Gender (0/1; 1 =male)	1.34*** (.26)	1.34*** (.35)	1.33*** (.27)	1.33*** (.34)	1.35*** (.27)	1.35*** (.36)
Singing (0/1)	1.05** (.44)	1.05** (.41)	1.02** (.44)	1.02** (.42)	1.16*** (.44)	1.16*** (.37)
Choir (0/1)	.074 (.41)	.074 (.74)	.034 (.42)	.034 (.77)	-.10 (.42)	-.10 (.70)
Children music education (0/1)	-.58 (.47)	-.58 (.78)	-.55 (.47)	-.55 (.69)	-.46 (.48)	-.46 (.42)
Coreness			1.43 (5.78)	1.43 (7.61)	1.38 (5.78)	1.38 (8.1)
Coreness²			-20.47 (25.37)	-20.47 (37.51)	-13.36 (24.12)	-13.36 (47.5)
Degree					.11* (.06)	.11* (.06)
Degree²					-.002* (.001)	-.00 (.00)
Closeness					.01 (.01)	.01 (.01)
Closeness²					-3.7e-06* (2.1e-06)	-3.7e-06 (2.5e-06)
Constant	-.66** (.24)	-.62** (.30)	-.58** (.25)	-.58** (.33)	-7.04 (4.28)	-7.04 (4.28)
N	253	253	253	253	253	253
Prob>chi2	0.000	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.04	0.04	0.04	0.04	0.06	0.06

*p < 0.1; **p < 0.05; ***p < 0.001.

and external ties (the median was preferable to the average in this case because of the presence of a major outlier, CDM, in particular when it came to named collaborations outside the system). We identified four organizational types, defined by different combinations of teachers' internal and external collaborations (Table 5): the first of them (top left) grouped schools (Zandonai and SMG) whose teachers were engaged in numerous external collaborations, but did not have the same amount of contacts with colleagues in the Trento system. Teachers from schools in the top right quadrant were significantly involved in collaborations with musicians both outside and inside the system. Of particular note is the large volume of musical collaborations, internal and external, in which CDM members were involved (Table 4). Similar to CDM, SMAG also devoted special attention in its programs to jazz and pop music. As for the other two schools, both based in Trento, Diapason and Minipolifonici favored classical music, the latter with special attention to children education. The quadrant on the bottom right consisted of schools, whose teachers were primarily oriented toward collaborations within the TMS system, and had limited external collaborations (the Eccher school in Val di Non and the Pentagramma school in Val di Fiemme). Finally, the quadrant on the bottom left included schools, whose teachers appeared less likely to collaborate, either within the TMS system or externally (Opera Prima, Moser, Novak and Primiero).

According to our hypotheses, we expected schools in the upper-right quadrant to provide the most conducive environment to record production (H2a), and schools in the bottom-left one to be most focused on other aspects of musicking such as music education (H2b). Two dummy variables reflected these expectations in our regression models (Tables 7–9). Table 6 below reports the correlation coefficients between all the independent variables used in our models. With the strongest correlations barely exceeding .3, risks of multicollinearity seem limited.

4. Analysis

Given the nature of our dependent variable as count data and the number of musicians with no record productions to their credit, negative binomial regressions seem to be the most appropriate option to explore the impact of relational patterns on record performance. We first introduce our (limited) set of control variables, which focuses on the role of gender (model 1, Table 7). Results are consistent with the fact that male teachers average 2.05 productions, female teachers only 0.67. This is likely to depend on a complexity of factors that we are unable to explore within the limitations of this study, ranging from inequality in the allocation of family tasks to glass ceiling issues. Among activities with a strong female presence, teachers of singing are significantly more

Table 8

Negative binomial regressions of record production.

	Model 7 (standard)	Model 8 (bootstrap)	Model 9 (standard)	Model 10 (bootstrap)	Model 11# (bootstrap)
					Without CDM school
Gender (0/1; 1 =male)	1.35*** (.26)	1.35 *** (.24)	.77*** (.28)	.77*** (.27)	.91*** (.26)
Singing (0/1)	1.22*** (.43)	1.22*** (.37)	.70 (.48)	.70 (.44)	1.10*** (.48)
Choir (0/1)	-.00 (.40)	-.00 (.52)	-.03 (.47)	-.03 (.52)	-.00 (.58)
Children music education (0/1)	-.45 (.46)	-.45 (.49)	-.52 (.45)	-.52 (.55)	-.91 (2.5)
Coreness	.48 (5.61)	0.48 (7.62)	-.19 (5.96)	-.19 (8.67)	1.56 (11.36)
Coreness ²	-13.19 (24.71)	-13.19 (56.86)	-7.57 (24.33)	-7.57 (102.39)	-8.39 (107.62)
Degree	.07 (.06)	.07 (.09)	.06 (.19)	.06 (.19)	.06 (.09)
Degree ²	-.00 (.00)	-.00 (.00)	-.01 (.02)	-.01 (.02)	-.00 (.00)
Closeness	.00 (.01)	.00 (.00)	.01 (.01)	.01 (.01)	.00 (.00)
Closeness ²	-2.3e-06 (2.1e-06)	-2.3e-06 (2.7e-06)	-2.7e-06 (2.1e-06)	-2.7e-06 (2.1e-06)	-2.3e-06 (2.5e-06)
High efficacy expected (Burt)	.82*** (0.23)	.82*** (0.27)	.60** (.24)	.60* (.35)	.49 (.27)
Low efficacy expected (Burt)	-.02 (.29)	-.02 (.29)	.36 (.31)	.36 (.39)	.27 (.26)
Total collaborations			.05*** (.01)	.05*** (.01)	.04* (.02)
EI-index			-.08 (.17)	-.08 (.17)	-.00 (.17)
EI-index ²			-.87*** (.27)	-.87*** (.26)	-.85*** (.19)
Constant	-4.69 (4.22)	-4.69 (5.92)	-5.26 (4.43)	-5.26 (4.20)	-4.18 (5.55)
N	253	253	171	171	153
Prob>chi2	0.000	0.000	0.000	0.000	0.000
Pseudo R2	0.08	0.08	0.10	0.10	0.08

*p < 0.1; **p < 0.05; ***p < 0.001.

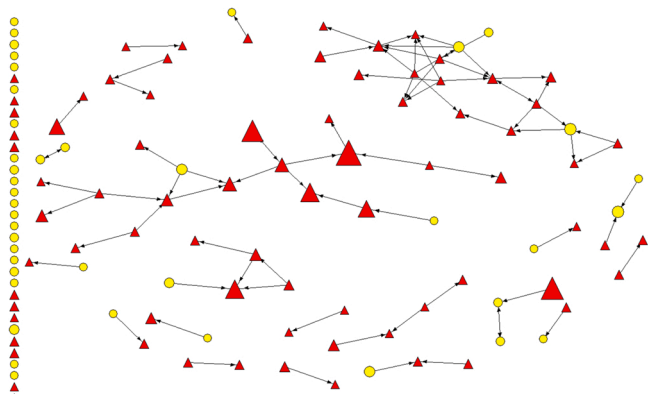


Fig. 2. Major collaborations between musicians in the TMS system (yellow circles: female teachers; red triangles: male teachers; node size proportional to number of recordings).

likely to be involved in record production. Again, this is hardly surprising considering the importance of female singers in musical performance. Other findings are more interesting. Given women's overrepresentation in any kind of educational activity or care-provision, we expected a negative sign in the relation between involvement in the basic musical training of children and record production. We found it, but it is not significant, unless we drop the variable "gender" from the model. Moreover, instruction in coral music has no impact over record production. These results are confirmed if we run the same regression with a bootstrap routine to check for the robustness of standard errors

(model 2: given the difficulty to assume independence of cases we'll follow this approach throughout the different analyses proposed here).

The next step of the analysis (models 3–6) focuses on the position of individuals within the local network of TMS musicians. We use a quadratic formulation to test H1, suggesting a curvilinear relationship between record production and network position. In both models 3 and 4, individual position, measured as network coreness, shows no correlation to productivity. We reformulate the hypothesis assuming a curvilinear relationship to related measures such as degree and closeness.⁵ Standard estimates suggest moderately significant (.10) impacts, with decreasing effects for centrality and some curvilinear effect for closeness (model 5). However even these minimal effects largely disappear when bootstrap testing is used (model 6). On the other hand, both gender and singing teaching remain significantly correlated with record production.

We then move to take into account the profile of relations that characterize each school rather than each individual as a specific node (models 7–8, Table 8). More specifically, we look at the average involvement of teachers from each school in major collaborations to musicians within and out with the local music school system. Two dummy variables tell us if one school is above or below the median value on both measures. Musicians associated with a school whose staff is in the average highly connected on both grounds should be particularly productive; while musicians who work in an environment which is

⁵ Betweenness and eigenvector centrality correlate at over .8 with degree and are therefore omitted from our models; coreness correlates very weakly and negatively with degree (.05) and weakly and positively with closeness (.2).

Table 9
Alternative models (all bootstrapped).

	Model 12	Model 13	Model 14 (bootstrap)	Model 15
	Zeroinflated negative binomial	OLS with IHS-trans. dependent variable	OLS with HIS-trans. dependent & mean centered variables	Ordered probit
	Inflate			
Gender*** (0/1; 1 =male)	-20.81 (12.12)	.34** (.14)	.34*** (.15)	.52** (.25)
	Main model			
Singing (0/1)	.37 (.30)	.44 (.30)	.44 (.31)	.73* (.44)
Choir (0/1)	-.46 (.46)	-.06 (.29)	-.06 (.25)	-.15 (.43)
Children music education (0/1)	-.59 (.53)	-.37 (.27)	-.37 (.27)	-.49 (.56)
Coreness#	-.54 (13.4)	-1.34 (5.27)	-1.33 (2.86)	-.25 (7.69)
Coreness# ²	-4.43 (88.1)	.45 (32.4)	.90 (19.13)	-11.56 (46.63)
Degree#	.05 (.08)	.04 (.05)	.03 (.03)	.07 (.07)
Degree# ²	-.00 (.00)	-.00 (.00)	-.00 (.00)	-.00 (.00)
Closeness#	.01 (.00)	-.00 (.00)	.00 (.00)	.01 (.01)
Closeness# ²	.00 (.00)	-.00 (.00)	.00 (.00)	.00 (.00)
High efficacy expected (Burt)*	.59** (.29)	.38** (.17)	.38 (.16)	.49*** (.25)
Low efficacy expected (Burt)	.39 (.29)	.25 (.18)	.25 (.18)	.42* (.30)
Collaborations#***	.05*** (.01)	.03*** (.01)	.03*** (.01)	.04** (.02)
EI-index#	-.03 (.18)	-.01 (.09)	-.32** (.14)	-.03 (.17)
EI-index# ^{2***}	-.84*** (.29)	-.47** (.19)	-.48*** (.17)	-.74*** (.23)
Constant	-3.09 (4.84)	-2.38 (2.58)	.34 (.34)	
N	171	171	171	171
Prob>chi2	0.000	0.000	0.000	0.010
R2	—	0.26	0.26	0.13 (pseudo)

*p < 0.1; **p < 0.05; ***p < 0.001

#: mean centered variable in Model 14

particularly poor in relational terms should be expected to be less engaged in record production. This second hypothesis is not carried in either model. By contrast, musicians operating in highly connected organizations are significantly more productive than the rest. Introducing this term eliminates any effect, no matter how small, of measures of individual position in the local network (models 5–6), while the impact of gender and singing teaching is not affected.

The last section of the analysis introduces the role of musicians' most important collaborations. Models 9 and 10 in Table 7 show that while the overall volume of important collaborations matters, there is also an additional mechanism at play. This does not have to do with heterophily per se (the EI-index does not correlate with record production). It has to do with the fact that, regardless of their overall volume, musicians whose important collaborators are evenly distributed between the local and other musical communities are more likely to be engaged in record production. Introducing these variables reduces the impact of the schools' relational profile and its significance (down to level.1 in model 10). The effect of singing teaching also disappears, while the impact of gender is confirmed. Finally, we test the model by excluding data about musicians from the CDM school, whose productivity and relational patterns may be at least partially regarded as outliers. Model 11 reports the findings. The significance of organizational structures and overall

volume of collaborations is reduced, while singing teaching becomes significant again (this is understandable in the light of the fact that, given CDM's dominant focus on jazz, the relative weight of singing teaching is smaller than in other schools). At the same time, the central explanatory role of the two most important variables in the analysis, gender and the squared EI-index, is confirmed.

It may be useful to check the robustness of these results by fitting different specifications of the model. The first column in Table 9 reports for each variable the significance levels identified in model 10 from Table 8. Model 12 presents results from a zero inflated negative binomial regression. Here we assume that zero recording be inflated due to the impact of gender over record production. Results confirm the significant impact over productivity of the volume of individual collaborations and their balanced combination between ties internal and external to the local system, as well as of an organizational profile with relatively strong connectedness internal and external. Models 13 and 14, instead, present results of two ordinary least squares regressions in which the dependent variable has been subjected to IHS (inverse hyperbolic sine) transformation. Model 13 reproduces exactly the results obtained in model 10. As for model 14, it uses mean-centered variables in an attempt to reduce risks of multicollinearity related to the use of quadratic functions for several variables. The overall results are confirmed but for the fact that the EI index also becomes significant. Its negative sign, combined with the negative sign of the squared term, suggests that record production might be at its lowest when musicians are only connected to fellow artists who have no ties to the local musical system. Finally, we run an ordered probit regression after breaking down our dependent variable in three quantiles corresponding to 0 productions (123 cases), 1–2 productions (82 cases) and 3 or more productions (44 cases). Results once again confirm the findings from model 10. Admittedly, these model specifications present problems in their own right. In particular, running a zero inflated model to account for differences in record production may be subject to criticism as none of our variables inevitably implies zero production. We picked gender as the closest possible candidate but this is certainly a disputable choice. As for variable transformations with the IHS approach (that we chose over logarithmic transformation as it preserves zeros), units of measurement have been found to affect regression results heavily (Aihounton and Henningsen, 2021). Moreover, even after the HIS transformation, our dependent variable remained heavily skewed, which would make the use of OLS still unwarranted. Having said that, it is remarkable how different models still generate the same basic account of the main relational mechanisms behind record production. Most importantly, the consistently significant negative sign for the square EI-index suggests a convex shape for the relationship between production and network composition, as illustrated in Figs. 3 and 4 below.

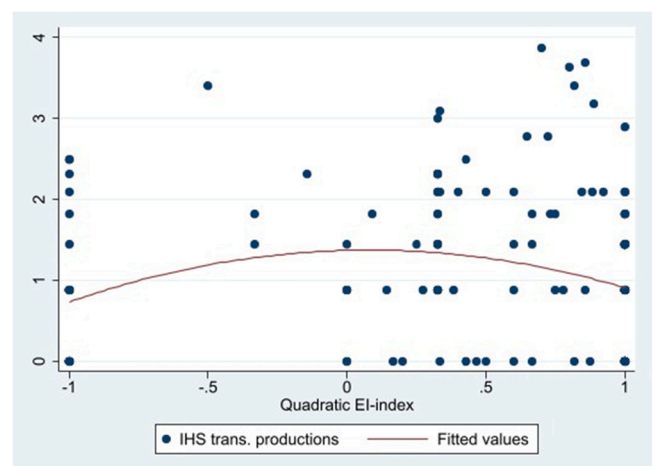


Fig. 3. Quadratic fit of EI-index over record production.

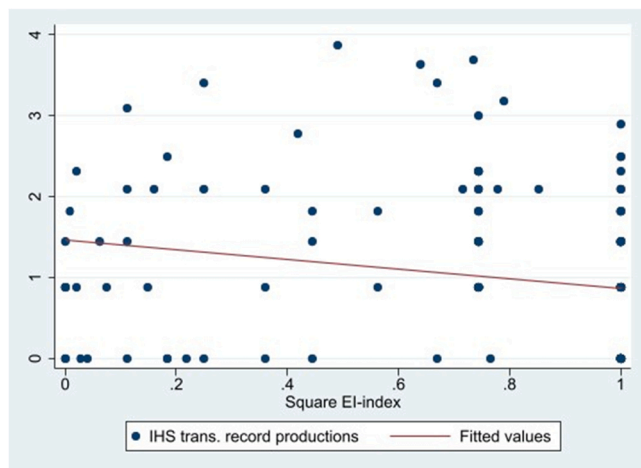


Fig. 4. Linear fit of square EI-index over record production.

5. Discussion and conclusions

How did our substantive hypotheses fare? Our data did not support H1, according to which “Musical production will be higher for musicians that occupy an intermediate position between core and periphery in their professional environment”. In this case, following suggestions from previous studies (in particular Uzzi and Spiro, 2005), focus was on individuals’ position in the broad and heterogeneous web of ties (not just the most important collaborations) that linked individuals to each other in the local music system. However, barring a modestly significant and linear impact of degree (i.e., of the overall volume of ties), musicians occupying central, peripheral, or intermediate positions in those multiplex networks did not seem to differ in their record production.

We were more successful when we moved our focus to the relational profile of the different schools. We found confirmation for H2a which suggested that “Musical production will be highest for musicians who are located in schools where on the aggregate teachers hold a balanced combination of internal and external ties”. Musicians in schools where teachers had a comparatively higher volume of both internal and external ties were actually more productive. However, the opposite did not hold for schools that were weak on both grounds: H2b, according to which “Musical production will be lowest for musicians who are located in schools where on the aggregate teachers are poorly connected both internally, and to other musical milieus” was not supported. Teachers in schools with that profile performed in a similar way to schools whose teachers had in the aggregate an intermediate profile.

Moving to the volume and composition of musicians’ personal collaborations, H3 was a purely relational one, proposing that “Musical production will be positively correlated to the overall volume of collaborative ties in which music teachers are involved.” This was constantly supported (models 9–15): musicians who are involved in several musical collaborations are also more likely to have some record production to their credit, and a higher number too than more isolated ones. Taking into account that, as we noted (Section 2), the overall amount of collaborations well exceeds the ties that people may have built around record production, this is a non-trivial finding. It adds one more piece of evidence to the long-established view of musicking as a relational process (as summarized e.g. by Crossley, 2020).

We also suggested that productivity might be related to involvement in ties that reached out of the setting in which musicians were primarily embedded, namely, the Trentino music school system. Accordingly, H4 read: “Musical production will be positively correlated to the proportion of collaborative ties that musicians have outside their local context/regular working environment”. We found no consistent evidence supporting this claim. As such, strong orientation to external ties, measured by the E-I index, did not correlate with higher productivity. The square

E-I index, however, was found to matter for variations in productivity. Rather than reliance primarily on ties outside one’s local relational context, what mattered was a balanced combination of external and local/internal (to the system rather than to specific schools) connections. Our data support H5 that “Musical production will be higher for musicians that may rely on a balanced combination of local and external ties in relation to their working environment”. Rather than at the volume of ties, this finding points at the importance of coupling embeddedness in specific settings with relations that give access to ideas and stimuli from other milieus. Musicians holding many but highly dispersed connections risk isolation from any specific context; in contrast, musicians strongly integrated in their local community but with little contact with the outer world are exposed to mechanism of self-referentiality and lock-in (Sacchetti, 2022). In particular, lock-in may refer to ways of doing music that are not receptive of evolving uses of sound, technologies, and musical taste; to loss of access to colleague’s expertise (for example due to mobility or generational change); dependence on school’s resources or on the local administration’s funding which may come to an alt. Looking at activists of contemporary transnational movements, political scientist Sidney Tarrow (2005) spoke of “rooted cosmopolitans” to reflect their combining embeddedness in specific national contexts with engagement in broad transnational issues and campaigns. On a smaller scale and in a different context, our findings suggest a similar mechanism.

Finally, we found gender to be constantly significant across all the models we have fitted. This is consistent with available evidence (Kahlert and Das, 2021; Wang and Horvát, 2019). Unfortunately, our data do not allow us to establish whether women’s lower involvement in record production depends primarily on glass-ceiling type of mechanisms, imbalanced division of labor within the family, lack of self-confidence, or else. They point, however, at female musicians’ persistent primary focus on teaching roles.

Reference to gender prompts a final warning about the limits of our dataset, and hence of our findings. As we have already pointed out, the fact that our data were obtained from musicians’ websites resulted in a limited number of control variables, mostly related to gender. Limitations also apply to our ability to capture organizational properties. In fact, we were only able to infer each school’s conduciveness to artistic practice from the aggregation of individual relational traits – namely, its teachers’ average involvement in individual collaborations. More genuinely organizational traits should be taken into account if this study were to be expanded. For example, a school leadership positively encouraging artistic activity alongside teaching might have an important, positive impact on teachers’ record production regardless of the specific ties in which teachers are embedded. Or, the fact that a school originated from musicians actively engaged in performing and recording rather than from people specializing in music education might have created a distinct organizational culture, likely to affect members’ attitude towards musical production in the long run. Nonetheless, for all its limitations, we still regard our evidence as strong enough to suggest that organizational properties may play an autonomous role in encouraging artistic production.

Questions also remain regarding the possible direction of the link between network properties and individual record production. In principle, one might argue that individuals active in many record productions would inevitably develop not only a larger, but a more heterogeneous set of collaborative ties; hence, the individual drive to productivity would shape individual networks, rather than the other way around. While we have information about the date of (most, but not all) records, the fact that our data on musicians’ collaborations originate from their websites does not allow us to locate those collaborations in time; therefore, we are unable to draw conclusions about causation by looking at the time dimension. In this paper we have conformed to the dominant approach in the literature, summarized in Section 1, that regards networks as preconditions of creativity and innovation rather than their consequence; when presenting our findings, we have also

tried as much as possible to use the language of correlation and correspondence rather than that of causation.

And yet, despite these notes of caution, we still regard worthy of attention our findings regarding the correlation between artistic production and a balanced combination of internal and external ties within individual networks (H5) and within the organizations to which musicians are contracted (H2a). They may not be presented as a comprehensive relational account of musicking, but they cast light on mechanisms operating between musicians whose primary focus is on teaching rather than artistic production. Our data may also encourage a better qualification of findings obtained in reference to performers active in musical (Phillips, 2011; Uzzi and Spiro, 2005) or other artistic fields (Juhász et al., 2020). While those studies suggested that a semi-peripheral location in their networks be a significant predictor of success, we found no supporting evidence for this claim here (H1). However, those studies focused on artists clearly focused on intellectual production in a global system; the structure of relations between musicians, whose primary professional focus is on the local teaching system, may not have the same impact. Even for this reason there is, we think, scope for further comparative explorations of the connection between artists' productivity (as well as, more broadly, vitality) and the social relations in which they are embedded.

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