Magical expertise: An analysis of Finland's national magician network

Olli Rissanen

*School of Applied Educational Science and Teacher Education, University of Eastern Finland,
olli.rissanen@uef.fi*

Tuire Palonen

Centre for Learning Research, University of Turku, tuire.palonen@utu.fi

Kai Hakkarainen

Department of Education, University of Helsinki, kai.hakkarainen@helsinki.fi

Abstract

A social network analysis among 120 Finnish magicians was carried out through assessing several variables: individual attributes; magicians' competence (expertise), various interactions (mentoring, advice seeking, collaboration), as well as the individuals' perceived status (respect and admiration) and social position. Competence in the skills needed in the domain is the result of a large amount of practice, and institutional education is mostly missing. The tricks of the trade are learned form the more experienced members, or created by magicians themselves. Mediating tricks takes place only inside trusted sub-groups or sometimes the magicians sell the tricks or presentations to each other. The data for the study were collected via questionnaire. The response rate was 81%. The results indicate that social network among magicians was rather sparse. There is, however, some activity on the community level related to advice seeking, support giving, and informal communication. All network dimensions are related to each other, i.e., there are many multiplex network ties among magicians. The analysis indicated that the magical networks shared characteristics of classical networks in terms of power distribution of networking linkages; there were a large number of participants with a few or no linkages at all whereas a small percentage of key actors were extremely well connected with participants of the network. Consequently, peer evaluation indicators measuring support, advice and admiration varied a great deal between the magicians. Based on the cluster analysis, the magicians can be classified as "Community core" (4), "Masters" (9), "Background persons" (13), "Practitioners" (72), and "Soloists" (18), and unclassified (4). Community core is a group consisting of a few prestigious, experienced magicians keeping up the magical network, intensively supporting other magicians on the field, providing advice to other community members. Masters are highly respected magicians who are guiding other magicians but not as intensively as the Community core. Soloists are rather well known and highly respected but not so much engaged in giving advice as Masters or the Core. Practitioners constitute the biggest group that is not very tightly connected to the rest of the group, and, presumably, not so well known in the field. It is concluded that age or seniority does not explain magician competencies as assessed by their peers; while all of the most highly regarded magicians had gone through more than two decades of practice, ages of the most prestigious magicians varied a lot and included some relatively young participants.

Keywords

Magical network, magical expertise, networked expertise, social network analysis

Introduction

The purpose of the present study was to examine networked expertise of Finnish magicians. Several hundred people practice magic in Finland. Magical activity relies on complex skills and competencies cultivated across years in informal communities and networks and tested through repeated public performances. Expertise has been studied across many domains of arts, sports, games, professional and academic activity (Ericsson, 1996; Ericsson & Starkes, 2003). Just as in any other domain of expertise, expertise in magic relies of well-organized and usable bodies of historically accumulating knowledge and mediating instruments, techniques, and practices. Across multiple fields there appears to be so-called ten-year rule according to which the development of

expertise takes up four hours of daily practice across ten years (see Simon & Chase, 1993; Ericsson; Krampe, & Tesch-Römer, 1993). From the perspective of developing expertise, pursuit of deliberate practice (Ericsson, 2003; Ericsson et al., 1993), i.e., systematic effort in improving various aspects of performance as well as its overall organization, play a critical role. Such practice is not self-rewarding like a competition and requires reflective efforts in analyzing, testing, and improving performance. Instead of mechanical repetition, deliberate practices involve specific training activities that are skillfully tailored to the emerging requirements of developing competence. Practice not only involves assimilation of already existing tricks and techniques, but may rather be seen as a process of pursuing novelty, innovation, and practice transformation (Paavola, Lipponen, & Hakkarainen, 2004). Because many people stop practicing after achieving a satisfactory level of accomplishment, there is usually not a direct correlation between the length of experience and level of performance (there any many "experienced non-experts"; Bereiter & Scardamalia, 1993). Intensively practicing newcomers are sometimes able to reach a very high level of performance more quickly than less intensively practicing agents.

While magicians' exceptional competences appear mysterious and hard to understand for outsiders, they are able to capitalize on their socio-culturally evolved collective expert or skill culture (Hakkarainen, Palonen & Paavola, 2002; Hakkarainen, Palonen, Paavola & Lehtinen, et al., 2004). Because magicians do not have any official or formal study program in Finland, this field appears to profoundly rely on such informal communities and networks. According to Wenger (1998), expertise and competence are transmitted through intensively functioning but unofficial COPs. For a well-determined domain, we define a *community of practice* (Lave & Wenger, 1991) as follows: a group of persons with particular skills or expertise who interact formally within an organization, or informally – but routinely – in a type of network for shared pragmatic or knowledge-related goals. Magicians' COP is built around the shared enterprise of developing instruments, techniques, and practices relevant for magical performance. The COP metaphor appears to be well suited to this self-organized domain without institutional education or formal hierarchical roles that often determine organizational activity. Many of the participants appear to feel very much passionate about magic and take jointly take responsibility for advancing the field. COPs carry both formal and informal, codified and non-codified, and embedded cultural knowledge of the domain and provide access to cultural tools and practices. From this perspective, learning is a process of becoming a member of a community by gradually moving from a newcomer's peripheral to old-timer's full participation (Lave & Wenger, 1991). Learners are not mainly acquiring explicit, formal "expert knowledge," but the embodied ability to function as community members (Brown & Duguid 1999). By participating in magical COPs, the practitioners of the field get access to collective knowledge, share their skills and practices, guide one another, and document their activities. Collective activities are essential also for assessing prevailing practices, experimenting with new techniques, exploring novel possibilities, producing new knowledge, and learning from personal and collective experiences.

A specific characteristic of magical activity is that the magical communities aim actively to keep tricks secret, at least beyond the elementary level. Only after becoming a full community member, is a newcomer provided with some access to information. Just as in any other competitive field, magicians may not be willing to share their secrets without a very high level of personal trust. Therefore, it is very difficult for an outsider to get access to a closed magical network. A participant has to demonstrate by his or her own actions that he or she is seriously and systemically pursuing magic and is able to use collectively developed tools and instruments in an appropriate and productive way. Only achievements in magical performance provide appreciation among the network participants. The beginner's competencies are less important than his or her enthusiasm. Many prospective magicians, however, discontinue after getting frustrated or going though changes in life circumstances; that is the reason for the masters sharing their expertise selectively with the most determined ones, who are actively seeking feedback and are committed to rise to the next level of performance. Sustained processes of personal coaching and mentoring between masters and novices play a crucial role in transmission of higher-level expertise in the field. In addition, the magicians have formed a National Magician Network that organizes various workshops and conferences for facilitating sharing of knowledge concerning latest tricks, techniques, and magical innovations.

Our earlier investigations indicate that social network analysis provide very effective tools of analyzing networked learning phenomena (Palonen & Hakkarainen, 2001; Lipponen, Rahikainen, Hakkarainen, & Palonen, 2002). Hence, the present investigation aims at examining the overall social network of Finnish magicians. We are interested in examining how magicians share knowledge of the secret magical tricks, how knowledge and competence is transmitted among network members, and how personal characteristics go together with the network positions in the network of magical practice. We expect a loose and effective network

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having a small number of central actors in the centre of the network (Granovetter, 1990) allowing effective information flow. A network is structurally cohesive when ties are distributed evenly across the network, implying no gaps in the underlying structure. According to previous research (Barabasi, 2000; Bruggeman, 2009), large networks grow according to power laws: New network members build their links not randomly but around highly linked experts or hubs.

Research questions

The present study focuses on examining the role of the social structure of magicians' communities as well as their members' indicators of magician expertise and their colleagues' respect for their performance. Through the analysis of magicians' interaction and groupings, we address the following research questions: (1) What kind of social structures mediate the Finnish magicians' network community? Toward that end, we analysed the density and centrality of the network as well as distribution of the network cohesion. (2) To what extent may the structure of the magical network community be explained by combining social and individual aspects of expertise? The study aimed at investigating peripheral (isolates) and central members in the community and individual characteristics typical of those in central network positions. In order to combine social and attributive properties of expertise, we asked how individual skills, properties, activity and popularity in community were related in respect to participation and collaboration. Investigators often argue that seniority and the level of expertise determine the centrality in a community. Through years spent in the community, the members get into the core by participating to the enculturation process (Lave & Wenger, 1991). The present investigation examined, *inter alia*, whether it is possible to find empirical evidence for this frequently cited premise.

Method

Participants

Data concerning the magicians' networking relations were collected by a questionnaire based on a name list of the members of the national magician network. The sample involved practically all of the most highly regarded Finnish magicians. Some of the participants were professionals while others were active amateur practitioners. The participants were asked to assess, in relation to each other participant, the following networking dimensions and mark by x those community members 1) from whom they ask advice and guidance concerning magical activity; 2) whom they appreciate as a performing magician (admiration and respect); 3) with whom they are in collaboration, 4) who they consider as an important influential background person of the field (support provider), and 5) with whom they are in informal interaction. The network questionnaire elicited responses from 120 members of the magician community; the response rate was 81 %. Among the magicians that have answered to the questionnaire there are 31 professionals, 35 semi-professionals, 17 active amateurs, 8 newcomers, 17 retired magicians and 12 persons that are loosely connected to related fields but who are not magicians, such as a sword swallower, a ventriloquist, and other show artists.

SNA and other statistical tools

Social network analysis was carried out by the UCINET6 program (Borgatti, Everett, & Freeman, 2002); the analysis focused on 1) the cohesion of the networks in terms of density of networking relations; and 2) centrality of the participation. The present study combines the community level results with the personal level attributes. At the community level, the centrality (tie distribution) and density (number of the ties) of the collaboration, advice asking and informal ties were calculated. At the personal level, the peer evaluations (the column sums in the matrices) were used to create indicators by nominating respected magicians and influential background supporters. Further, advice asking, collaboration, and informal communication were calculated at the personal level, producing the measures of peer evaluation (Freeman's in-degree, i.e. the column sums) and self-reports (Freeman's out-degree, i.e. the row sums); the analyses were focused on the peer evaluation. Cluster analysis was used to classify the magicians. The analysis was based on the advice-in variable (how frequently they provided pieces of advice to their colleagues), nominations (how highly they were respected, or mentioned as background actors by their peers), and the total years of practice on the field.

MDS analyses
Networking relations were visualized by using multi-dimensional scaling (MDS). Scaling method is used to transform network graphs to more intuitive metric distance measures that make visible complex network patterns providing visual representations of the networks investigated. In the analysis, a non-metric analysis that

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keeps principal components in rank-order (Torsca) was used, and it was performed on symmetric matrices based on all network dimensions: advice asking, collaboration and informal communication.

Results

Network level

The overall analysis showed, according to expectations, that the network was rather sparse and somewhat centralised across all network dimensions measured. For advice asking the density was 8%, for collaboration 9%, and for informal communication 8%. The connections were not distributing equally among network members. For advice asking, the centrality value for the whole advice network was 45% for in-coming ties (column values). Regarding collaboration, the centralization was 41% and for informal communication, the centralization was 24%. Although magicians differ from one other in respect of providing advice and engaging in collaboration, informal communication is rather evenly distributed among the participants.

QAP correlation analyses, calculated at the network level, indicated that the variables are highly correlated, indicating multiplex relationships. This means that magicians often collaborate, ask for advice from and keep informal contacts with the same colleagues. The Pearson correlation for informal communication and collaboration is 0.520 (p<0.001); for informal communication and advice asking 0.395 (p<0.001); and for collaboration and advice asking 0.534 (p<0.001).
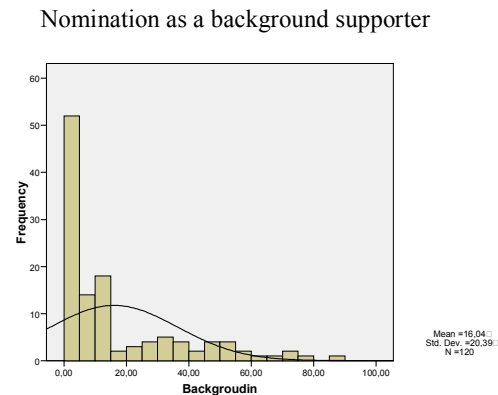
Personal level

An analysis of the network data at the personal (individual) level indicated that the connections were not distributed equally among network members. Especially interesting are in-coming ties (i.e., peer evaluation) across advice asking, collaboration, and informal interaction. While some participants tend to over-emphasize their connectivity when reporting links to other network members, in-coming ties represent the whole community's assessment of centrality of a participant. The mean value of advice asking was 9; it was 11 in the case of collaboration, and 10 in the context of informal interaction. In spite of the fact that the mean values are very close to each other, there is a great deal of variation between the participants (interpreted here as a centralization at network level).

Figures 1-5 present frequency distribution of the participants according to various network dimensions; the y-axis represents frequency of participants and x-axis the respective number of ties. All of the figures resemble strongly the "power law" curves (Barabasi, 2002; Bruggeman, 2009) peaking at the left side of the figure. This phenomenon is especially strong in Figures 1 (nominated as a respected or admired magician), 2 (being nominated as an influential background person) and 3 (being asked advice). The figures indicated that a majority of the actors gets only few or not at all nominations. The "long tail" indicates that there are only a few very central persons and the variation among them is huge.

Reputation (in-coming ties)
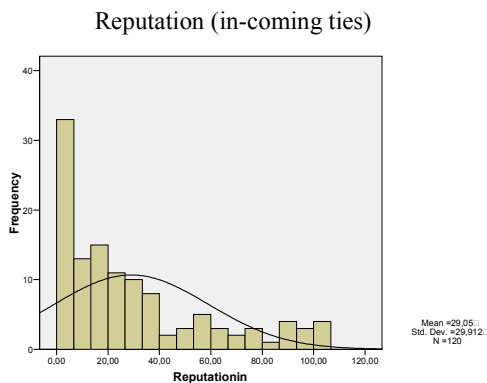
Figure 1. Frequency of in-coming nominations as a respected magician

Nomination as a background supporter

Figure 2. Frequency of in-coming nominations as an influential background

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According to what might have been expected, the analysis indicated further, that number of ties concerning collaboration (Figure 4) and informal interaction (Figure 5) were more evenly distributed. While basic shape of the distribution is similar to that of Figure 1-3 in terms of a large number of actors having a few collaborative ties and a few with a very high number of them. Nevertheless, most of the magicians have at least some collaborative partners (M=10, SD=9.7) so that the curve is decreasing more slowly than in the former cases.

In-coming advice asking
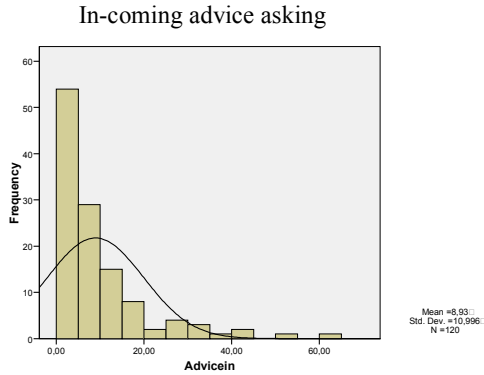
Figure 3. Frequency of participants asking advice

Collaboration (in-coming ties)
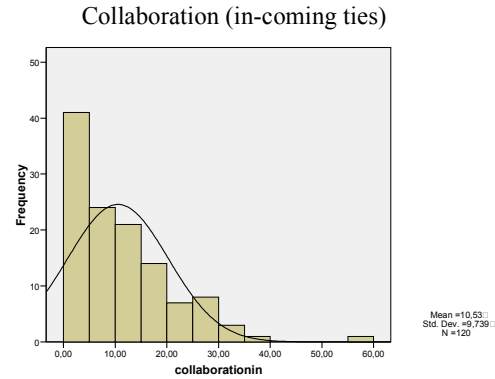
Figure 4. Frequency of collaborative relations (in-coming ties) between magicians

Informal interaction (incoming ties
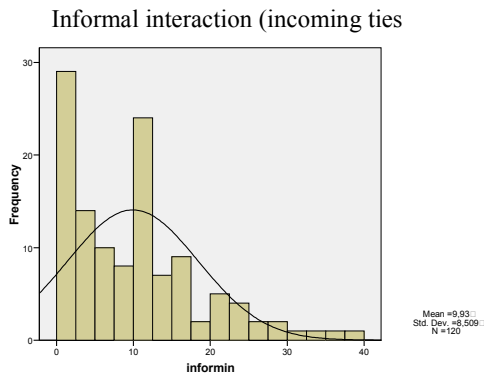
Figure 5. Frequency of in-coming informal interaction ties

Further we analyzed correlations between personal level network attributes data and certain independent variables, such as age and the length of practice (how long a participant had been training magic). For this analysis, the length of practice was categorized according to three classes (1=less than 10 years of practice, 2= 10-20 years practice, 3= more than 20 years of practice). Pearson correlations between the personal level network measures and independent variables are provided at Table 1. At the personal level, all network variables correlated very highly with each other; this is a common observation in network studies. Age correlates with being an influential background person as well as trivially with length of training.

Table 1. Correlations between network measures, age, and length of practice

		Reputation (in)	Advice (in)	Collab (in)	Backround (in)	Practice (1-3)	Age(years)
Reputation	Pearson Cor.	1	,771(**)	,758(**)	,555(**)	,190(*)	,068
(in)	Sig. (2-tailed)		,000	,000	,000	,041	,463
Advice	Pearson Cor.	,771(**)	1	,902(**)	,759(**)	,244(**)	,165
(in)	Sig. (2-tailed)	,000		,000	,000	,008	,071
Collaboration	Pearson Cor.	,758(**)	,902(**)	1	,666(**)	,218(*)	,049
(in)	Sig. (2-tailed)	,000	,000		,000	,018	,593
Background	Pearson Cor.	,555(**)	,759(**)	,666(**)	1	,371(**)	,477(**)
(in)	Sig. (2-tailed)	,000	,000	,000		,000	,000
Practice	Pearson Cor.	,190(*)	,244(**)	,218(*)	,371(**)	1	,537(**)
(1-3)	Sig. (2-tailed)	,041	,008	,018	,000		,000
Age	Pearson Cor.	,068	,165	,049	,477(**)	,537(**)	1
(years)	Sig. (2-tailed)	,463	,071	,593	,000	,000	

Note: N=120 in all other cells than those related to practice (N=116); four participants did not provide the training information.
** Correlation is significant at the 0.01 level (2-tailed).
*   Correlation is significant at the 0.05 level (2-tailed).

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There are statistically significant but relatively low correlations between length of practice and various network measures (i.e., being an influential background person, providing advice, engaging in collaboration and reputation as a magician); all of these based on in-coming ties, i.e., peer evaluation.

To conclude, those people that provide advice or are nominated as background persons, are respected, or vice versa. The older members are more often than the other nominated as background persons, but they are not respected more than the younger ones. The magical competencies do not appear to be tied with age.

Cluster analysis

Grouping participants to different categories according to their nominated reputation, role as an influential background support person, the number of incoming requests of advice and the length of practice (the above explained three-level categorization) was conducted by SPSS's k-means cluster analysis. The analysis indicated that the participating magicians can be classified as "Background persons" (13), "Community core" (4), "Masters" (9), "Practitioners" (72), and "Soloists" (18). The background persons are assistants and facilitators of the real activity. Community core is a group consisting of the 4 prestigious, experienced magicians that are undertaking a great deal of work in keeping up the magical network, supporting intensively other magicians on the field, providing advice to other community members. They even are higher up than Masters, especially in all variables measuring exchange and supporting the community. Masters, in turn, are highly respected magicians who are not, however, as actively involved as the Community Core in supporting other magicians. Practitioners constitute the biggest group. Relatively low values in advice in, background support, and reputation indicate that they are not very tightly connected to the rest of the group, most of them, presumably, not so well known in the field. Soloists, however, are better known and rather highly respected but not so much engaged in advice giving as Masters or the Core.
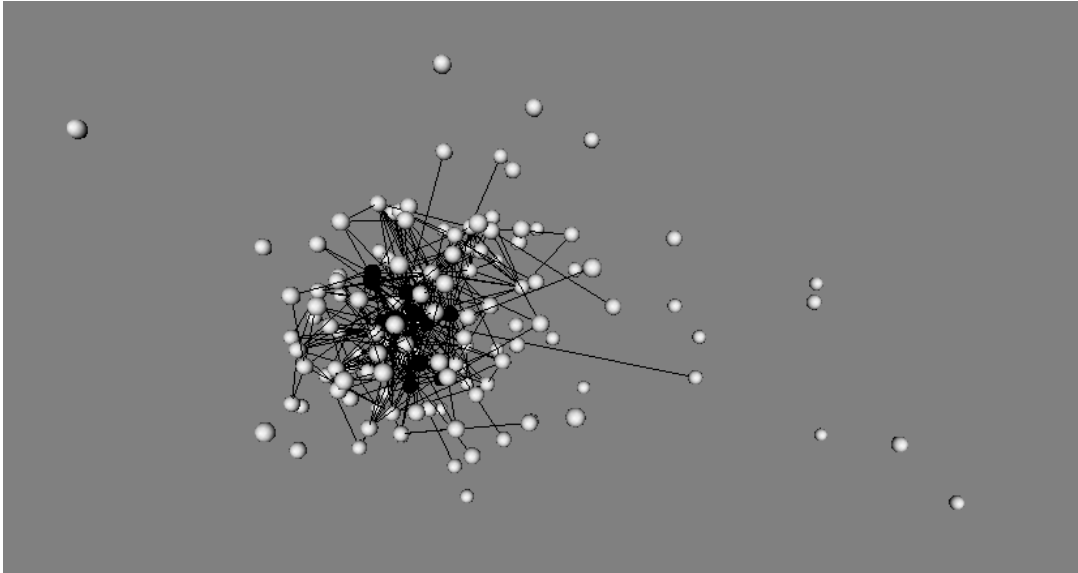
Table 2: Categories of Finnish magicians based on the k-means cluster analysis

Criteria of clustering	Final cluster centres of k-mean analysis				
	Background persons N=13	Community core N=4	Masters N=9	Practitioners N=72	Soloists N=18
Background (in)	44,31	72,75	41,67	4,51	11,50
Advice (in)	10,85	44,50	25,11	3,43	12,17
Reputation (in)	19,15	96,50	89,11	11,88	53,72
Practice (1-3)	2,85	3,00	2,22	2,07	2,28

Note. The length of practices was assessed as follows: 1=less than 10 years of practice, 2= 10-20 years practice, 3= more than 20 years of practice.

MDS analysis

The MDS (multidimensional scaling) map is based on advice asking, collaboration, and informal communication. Only mutual advice asking is indicated as ties (lines) at the map, but all network dimensions determine the distances between actors. The closer someone is at the map, the more they communicate, i.e. have ties with each other. We also constructed visual representations of the 3D map with M3D program (Nurmela, 2009). In the graph (see Figure 6), the most central actors (Community core and Masters) are indicated as black spheres while other magicians are colored white. The centralized structure of a rather sparse network can easily be observed. All central actors are close to each other, and there are many members on the periphery.

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Figure 6. The Finnish magicians' network. A view of the 3D MDS map. Central actors (black spheres) and mutual advice giving ties (lines) are indicated at the map.

Discussion

The present study focuses on examining the structure of Finnish magicians' network communities and identifying various types of actors functioning in the field. In the study, we used a network questionnaire for assessing various types of networks from nominating background persons and highly regarded magicians; in the network analysis we evaluated advice-seeking, collaboration, and informal interaction taking place between magicians. The relational data collected allowed us to analyze and examine the structures of magicians' networking activities. In order to overcome limitations of subjective assessment of networking linkages, the analyses highlighted peer reports rather than self-reports. The present study contributes by combining community level analysis with personal attributes and indicators. This is a relevant procedure in the domain where institutionalized education plays a minor role and where mastering the professional skills takes a massive amount of practice, which can be facilitated by mentors or more experienced members, that is, where the apprenticeship model is still strong. In studying such a domain, contextual knowledge is crucial. In the present case, the field is known by researchers because the first author of this paper is magician himself.

The results indicated that the magicians' networks were relatively sparse. Reputation as a magician, citations as an influential background person, and requests for providing advice were unequally distributed among the participants. These distributions appeared to follow the power law: there were many persons having no or a few ties and a small number of central actors having a very large number of ties. Informal interaction and collaboration, in contrast, were more equally distributed. The cluster analysis based on reputation, the number of advice requests, citations as to role in background support, and the length of practice indicated that there were four distinct categories of magicians; Four magicians constituted the community core that was most highly respected and involved in a wide variety of support and community-building activities. Nine magicians constituted a separate Masters group that was highly regarded but did not provide an equal amount of support for the magical network compared to the Core. The soloists here relatively highly admired, focused on working on their own or in a small group. Background persons assisted the magicians' community in various ways. Finally, there was a large number of (amateur) practitioners who did not score high on any of measures used. All of the groups reported a very long history of practice and training.

The Finnish magician network shares many of the characteristic of a classical network in terms of the power distributions of networking linkages. The metaphor of COP appeared to fit nicely in the present case in which practical competence rather than hierarchical position or institutional education determines network positions. A special characteristic of magician network is its closed nature; sustained learning efforts and practical demonstrations of competent magical performance are conditions of giving even a partial access to magical

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secrets and know how. There are, however, some indications that the Finnish magical culture is transforming and becoming more open due to the emergence of the Internet and social media. Earlier one was practicing alone, or sometimes coaching of magicians took place in intensive personal interaction between a newcomer and an old-timer. In 1998, the Finnish Magic Web was created (http://asiakas.skdata.fi/taikaweb/foorumi/), i.e., a knowledge sharing and discussion forum for Finnish magicians. Participants who order a national magical journal entitled "Joker" are provided access to the website. It involves several sections, such as 1) General discussion, 2) News box, 3) Questions and answers, 4) Events, performances, and lectures, 5) Magic web radio, 6) Link library, 7) Review (books and performances), and 8) Flea market. Younger magicians are sharing videos of their performances through the Internet, sometimes even at the stage of practicing the tricks in question. Such videos, available nationally as well as globally, allow the audience to analyze observed action in many details and, thereby, learn some earlier hidden tricks of the trade. Internet has significantly elicited international contacts between magicians, although only a minority of magicians follows international discussion forums of the field. In order to analyze in details sharing of magical expertise, the present investigators are pursuing parallel studies in which prominent magicians are interviewed and the development of expertise through apprentice-master interaction analyzed in details by videotaped participant observation.

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