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The Ties that Do Not Bind

Group formation, polarization and conflict within networks of political elites in the medieval Roman Empire

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Abstract

This chapter aims at the exploration of concepts and methods of network and complexity theory as well as New Institutional Economics (NIE) for the analysis of the emergence of conflicts within ruling elites in pre-modern polities. From the point of view of NIE, Douglass C. North, John Joseph Wallis and Barry R. Weingast have pointed out the general structural weakness of pre-modern formations of power. This assumption will be tested against a comparative analysis of the structural and qualitative properties of elite networks, also in their temporal and spatial dynamics. The modelling of the relational web among elite members will also open a micro-perspective on the evolution and resilience of networks between actors within smaller groups and clusters in situations of conflict. Furthermore, it allows for a quantification of the size of conflicts within elite networks and the analysis of their temporal dynamics.

1 Introduction*

In the year 970 CE, a “Roman”¹ army under the command of Bardas Skleros and his brother Constantine near the city of Arkadiupolis in Thrace faced the “Scythians”² (actually, the Rus), who had conquered Bulgaria and now launched an invasion of the empire. The historian Leon the Deacon describes the heroic deeds of the two Skleroi during this battle:

“Then the patrikios Constantine, Bardas’s brother, whose face was just sprouting its first growth of down, but who had an enormous body, with irresistible and invincible strength, drew his sword and went to strike the Scythian. The latter, however, perceived his assault, and avoided the blow by bending back toward the haunches of his horse. The horse received the blow on its neck, which was cut through; and the Scythian tumbled down together with his horse and was slain by Constantine. [...] one of the prominent Scythians was distinguished from the others by the size of his body and the gleam of his armour [...]. Bardas Skleros rode out on his horse and struck him on the head. The sword went right through to his waist guard, neither his helmet nor his breastplate being strong enough to withstand the strength of his arm or the slash of his sword. When he was cut in two and dashed to the ground, the Romans shouted for joy and were encouraged to brave deeds, while the Scythians, terrified by the novel and extraordinary blow, broke their close formation with lamentation, and turned to flight.”³

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- 1 On the self-perception of the “Byzantines” as Romans see esp. STOURAITIS (2014), p. 175-220, and most recently KALDELLIS (2019), who however (p. 160) advises against the use of “the typical scare quotes around the dreaded word” Roman in connection with Byzantium. Following conventions of the field of Byzantine Studies, however, I will use the terms “Roman” (respectively “medieval Roman”) and “Byzantine” as well as “medieval Roman Empire”, “Byzantine Empire” and “Byzantium” interchangeably in this paper. This also serves the prevention of misunderstandings since one of the anonymous reviewers has referred to the label “Medieval Roman Empire” used for the title of this chapter as “somewhat delusive”.
- 2 Cf. MÜLLER (1972–1980) on the use of ancient termini in Byzantine sources for contemporary neighbouring peoples.
- 3 Leonis Diaconi Caloënsis historiae libri decem et Liber de velitatione bellica Nicephori Augusti, ed. K. B. Hase, Bonn, 1828 (Corpus Scriptorum Historiae Byzantinae 3), c. VI, 12-13: “Κωνσταντῖνος δὲ ὁ πατρικίος, σὺναμπος τῷ Βάρδα τελῶν, ἄρτι τῷ ἰούλῳ τὴν γένυν

Leon the Deacon (ca. 950-1000 CE), although a member of the palace clergy, had himself taken part in imperial campaigns and had experienced battle at first hand; at the same time, he knew the proclivities of his audience, who appreciated the colourful depiction of martial exploits by towering horse-warriors of noble background.⁴ Leon's audience would include peers of the two heroes of this episode, the brothers Bardas and Constantine Skleros, who represented one of the most powerful families of the Byzantine Empire in the later 10th century.⁵ Their prestige among their fellow noblemen depended not least on their martial qualities and their effective propagation. This passage from Leon the Deacon therefore provides several insights into the "habitus" (to speak in terms of Pierre Bourdieu) of significant members of the Byzantine elite in this period.⁶

2 Networks of patronage and elite status

The focus on one selected and relatively well-documented elite family within a well-studied period of Byzantine history (for the state of research, I refer to the older works of SEIBT, WINKELMANN and KAZHDAN and more recent studies by CHEYNET, HOLMES, BEIHAMMER and KALDELLIS⁷) allows us to reflect on the relational framework of the emergence and dynamics of elite status and elite networks in the medieval Roman state, which may be of interest also for other polities across the pre-modern world. The first member of the Skleros family we encounter in Byzantine sources is Leon Skleros, who in 805 CE served as *strategos*

ἐπιχνοάζων, πελώριός τε πεφυκώς τῷ σώματι, καὶ τὴν ἰσχὺν δυσεικβίαστος καὶ ἀκαταγώνιστος, τὸ ξίφος σπασάμενος ἵεται τὸν Σκύθην βαλεῖν ὁ δὲ, τὴν φορὰν αὐτοῦ ὑπειδόμενος, ἐκκλίνει τὴν πληγὴν, κατ' ἰσχίον ὑπτιάσας τοῦ ἵππου. δέχεται δὲ ταύτην παρὰ τὸν αὐχένα ὁ ἵππος, ὃν διαμπερὲς ἀποτεμένεται· ὁ δὲ Σκύθης, ἅμα τῷ ἵππῳ κατενεχθεὶς, πρὸς τοῦ Κωνσταντίνου ἐναποσφάττεται. (...) τῶν ἐπιφανῶν τις Σκυθῶν, μεγέθει σώματος καὶ ὅπλων λαμπρότητι πεφυκώς τῶν ἄλλων ἀριπρεπὴς (...) τοῦτον Βάρδας ὁ Σκληρὸς ἐξιππασάμενος παίει κατὰ τῆς κεφαλῆς, καὶ μέχρι τοῦ ζωστήρος τὸ ξίφος διήλασε, μήτε τοῦ κράνους αὐτῷ ἐπαρκέσαντος, μήτε τοῦ θώρακος τὴν τῆς χειρὸς ἐπισχόντος ἰσχὺν, ἢ τὴν τοῦ ξίφους τομὴν. διχῇ δὲ τούτου διατμηθέντος καὶ προσαραχθέντος τῇ γῇ, Ῥωμαῖοι μὲν ὑφ' ἡδονῆς ἐπηλάλαξαν, καὶ πρὸς ἀλκὴν ἐπερρώσθησαν· Σκύθαι δὲ, τῷ καινῷ καὶ ἀλλοκότῳ τῆς πληγῆς ἀποδειλιάσαντες, σὺν οἰμωγῇ τὸν συνασπισμὸν διαλύσαντες, εἰς φυγαδεῖαν ἐτράποντο." TALBOT / SULLIVAN (2005), p. 159-160.

4 TALBOT / SULLIVAN (2005), p. 36-47; TREADGOLD (2013), p. 236-246.

5 SEIBT (1976).

6 REHBEIN (2011), p. 86-98; HENNIG / KOHL (2011). For the use of this concept see also GRÜNBART (2015); RUMMEL (2007). Cf. also KAUTSKY (1997), p. 169-177.

7 SEIBT (1976); WINKELMANN (1987); KAZHDAN / RONCHEY (2009); CHEYNET (1996); HOLMES (2005); BEIHAMMER (2003), p. 21-58; KALDELLIS (2017), p. 83-87, 96-97.

of the military province (*thema*) of *Peloponnesos* with its headquarter in Corinth.⁸ Most probably, “*skleros*”, which means “hard, pertinacious” in Greek, originally was a sobriquet applied to Leon or one of his forefathers, maybe also referring to warlike qualities. As in several other cases, this epithet from the 9th century onwards became a family name to indicate affiliation with one of the newly emerging noble lineages. After the hiatus of the 7th-8th century CE, elite families in the medieval Roman Empire again used surnames as markers of the increasing “symbolic capital” (this term again borrowed from Bourdieu) intrinsic to them.⁹

We also learn that Leon Skleros was of Armenian origin, stemming from *Mikra Armenia* (the region of Sebasteia/Sivas) at the Eastern Frontier of Byzantium.¹⁰ Again, the *Skleroi* were one among several families of the elite emerging from the regions on both sides of the frontier, which somehow became a “matrix” of the 9th-10th century military aristocracy. Since Late Antiquity, members of the aristocracy from both sides of the then Roman-Persian border had strived for the prestige, the material rewards and career opportunities connected with the military service for the empires to their west and to their east. Individuals of the same noble clan could serve on different sides of the frontiers, forming something like “trans-local families”; equally, individuals changed sides, sometime several times. Thereby networks of kinship and (sometimes conflicting) loyalties between elites emerged.¹¹ This can also be observed for the *Skleroi*: while they were engaged in Byzantine services since the early 9th century, another member of the family in the 840s is mentioned as “*synarchon*” (co-ruler) of the Emir of Melitene 'Umar ibn 'Abdallāh (r. 838-863 CE), who was a fierce opponent of the Byzantines. Obviously based on his retinue of Armenian warriors, this Skleros challenged the authority of his Arab overlord, which ended in several years of warfare; one may imagine that he could also rely on support from his relatives on the Byzantine side of the frontier.¹²

8 SEIBT (1976), p. 19-20 (with sources and further references); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 4409.

9 SEIBT (2002), p. 119-136; GRÜNBART (2015), p. 32-36. On “symbolic capital” cf. REHBEIN (2011), p. 110-117; HENNIG / KOHL (2011), p. 22-24. Cf. also KAUTSKY (1997), p. 197-205.

10 SEIBT (1976), p. 19-20; LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 4409. For doubts on the basis for this ethnic adscription see now KALDELLIS (2019), p. 174 and 178-179.

11 CHARANIS (1961), p. 205-231; SETTIPANI (2006); PREISER-KAPPELLER (2010), p. 139-215; BRUBAKER / Haldon (2011), p. 582-584; CHEYN et al. (2014), p. 175-192. On the notion of “trans-local families” see also HARZIG / HOERDER / GABACCIA (2009), p. 123-126.

12 SEIBT (1976), p. 21-23 (with sources and further references); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 6822 and nr. 8552.

Mobility towards the neighbouring imperial spheres thus was an essential element of the strategies of individuals and of aristocratic houses. Yet beyond aspects of power and material rewards, the very status of a nobleman depended on its recognition by his peers and even more by the emperor, the Great King or the caliph, performed in personal encounters.¹³ This “relational” character of elite status is also described by COSTAMBEYS, INNES and MACLEAN for the Carolingian case, for instance: “We tend to meet aristocrats in groups, designated as the *nobiles*, *potentes*, *proceres* or *optimates*: it was through acting together that aristocrats defined their social identity and came to perceive themselves as morally better than other social groups. [...] Social identities were not absolute, but had to be constantly reinforced and maintained.”¹⁴ Equally, Bourdieu has stated: “for the reproduction of social capital constant working on relationships through regular acts of exchange is necessary, through which mutual recognition is re-confirmed”.¹⁵ The embedding of noblemen in networks of kinship, loyalty and patronage thus not only provided “social capital” (according to Bourdieu, “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalised relationships of mutual acquaintance or recognition”¹⁶), but the very framework for the definition, performance and modification of noble status, with the emperor as central hub and source of recognition. The fiduciary relation between imperial patron and client became manifest in ritual and material ways; the new retainer was honoured in a ceremonial reception at the court and received valuable presents.¹⁷ As I have demonstrated elsewhere, the ability of the same noblemen “to fit in” at the courts in Constantinople, in Ctesiphon or in Baghdad was also based on an “aristocratic *koine*”, a language of ritual exchange and elements of a warrior “habitus” mutually understandable across borders in order to establish and maintain ties of patronage and loyalty in the wide area from Byzantium to Central Asia.¹⁸

3 Peripheries, centres and imperial brokerage

Via these channels, imperial centres across Afro-Eurasia attracted and bound valuable clients from the peripheries. Jonathan KARAM SKAFF illuminates for the Chinese case how these instruments “offered the utilitarian advantage of extending a[n ...] emperor’s power to spaces within a large multi-ethnic empire that were beyond the reach of bureaucratic control”. The same is true for

13 PREISER-KAPPELLER (2010); cf. also ELIAS (1969), p. 145–161; MAGDALINO (2009), p. 216.

14 COSTAMBEYS / INNES / MACLEAN (2011), p. 276–277.

15 BOURDIEU (1992), p. 49–80.

16 BOURDIEU (1985), p. 248; HENNIG / KOHL (2011), p. 22–24; FUHSE (2016), p. 183–187.

17 EL CHEIKH (2012), p. 517–538; PREISER-KAPPELLER (2010). Cf. also KAUTSKY (1997), p. 211–222.

18 PREISER-KAPPELLER (2018).

Byzantium.¹⁹ The emperor in Constantinople (or in Chang'an) thereby positioned himself at the centre of a network of aristocratic clans and individuals of heterogeneous backgrounds, thus also benefiting from intermediation or "brokerage" among different pressure groups. A classic point of reference of the significance of brokerage for the establishment and maintenance of power within medieval elites has become J. F. PADGETT and Ch. K. ANSELL's paper "*Robust Action and the Rise of the Medici, 1400–1434*". PADGETT and ANSELL analysed the political, economic and social interactions between elite families in early 15th century Florence and stated: "political control was produced by means of network disjunctures within the elite, which the Medici alone spanned. Cosimo de Medici's multivocal identity as sphinx harnessed the power available in these networks holes and resolved the contradiction between judge and boss inherent in all organisations."²⁰ Similarly, Karen BARKEY reconstructed the "Ego-networks" of social ties of the first Ottoman rulers in 14th century Bithynia. She highlights the contribution of "brokerage" between individuals from Muslim as well as Christian backgrounds to the power of the first Ottoman rulers: "We can understand the rise of Osman (1290-1324) and his son Orhan (1326-1359) as the leaders of an incipient state in terms of their initial construction of a hub-and-spoke network structure of which they became the center, as well as the brokerage they initiated among otherwise separated groups and their effective multivocality maintained by the network structure they assembled through their actions."²¹ More recently, Robert GRAMSCH has analysed the Holy Roman Empire in the turbulent years 1225-1235 CE as "network of princes"; he states: "The structure of these networks influences the intentions and actions of actors, while these action in turn continuously reproduce and modify the networks. In order to understand the options of action which a given network provides for an actor, one has to take into consideration not only the 'bare' sum of entanglements, but also the balance of power between actors, the differential of their control of resources, which can be of material and ideational character".²² The last point again hints at Bourdieu's differentiation between material, cultural and social capital, which all in turn can be converted into symbolic capital for the purpose of the legitimation of a regime, for instance.

4 Elite cohesion and emergent core groups

Yet, the structural dynamics of such a "hub-and-spoke network" was a delicate one and invited the emergence of competing "brokers" through the emergence

19 SKAFF (2012), p. 75 and 104; see also WERTMANN (2015).

20 PADGETT / ANSELL (1993), p. 1259-1319.

21 BARKEY (2008), p. 36-66.

22 GRAMSCH (2013), p. 29 (original text in German, my translation).

of ties among previously “separated groups” respectively the increasing cohesion among cliques of similar origins. The diversity of ethnic and geographic backgrounds for Byzantine elite families has been quantified for the 11th-12th century by KAZHDAN and RONCHEY. Among the ranks of the military aristocracy we recognise a high ratio of clans originating from the Caucasus as well as from neighbouring areas of Eastern Asia Minor, especially the region of Cappadocia.²³ In their monograph on Byzantine Cappadocia, Eric COOPER and Michael DECKER demonstrate the continuity during or at least the re-appearance of a group of powerful land- and flock holders of Cappadocia after the hiatus in our sources for the 7th and 8th century CE. Since the 9th century CE, several families from Cappadocia emerged as most important source of military commanders in the wars with the Arabs. The possession of large domains and flocks as well as the honour, prestige and material rewards connected to the military service for the empire against its “heathen foes” became essential elements of their status and self-image.²⁴ The ideal of the horse warrior in the name of God was embodied in the type of the mounted warrior saint, which became popular especially since the 7th century CE, again on both sides of the frontier.²⁵ At the same time, many of these families had close relations with or even originated from noble houses east of the border. In addition, several groups crossed the frontier from the East between the 7th and the 10th centuries CE, settled in Cappadocia and contributed to a mosaic of ethnic, linguistic and religious backgrounds, such as Armenians, Arabs, Syrians, Georgians, Persians or Khazars as well as followers of the sects of the Paulicians from Armenia and of the Khurramites from Persia.²⁶ Leading clans of these groups intermarried and found a common ground in the ideals of elite warfare. The power of these families increased since the end of the 9th century CE, when Byzantium started something of a “Reconquista” of territories at the border with the more and more fragmented Caliphate. Occupying the highest ranks in the army, some magnates of Cappadocia not only established kinship ties within their peers (thereby increasing the cohesion among this powerful group within the elite network), but also with the imperial family.²⁷

This is also true for the Skleroi; by the turn from the 9th to the 10th century CE they did not only act once more as military governors in Greece, but also as central commanders in Constantinople both in the army and in the fleet. In 895

23 KAZHDAN / RONCHEY (21999), p. 333-340. For doubts on the actual relevance of these attributions after several generations of integration into the Roman/Byzantine elite see, however, now KALDELLIS (2019), esp. p. 155-195 (on the “Armenians”).

24 COOPER / DECKER (2012), esp. p. 175-221.

25 GROTOWSKI (2010); IAMANIDZÉ (2016).

26 COOPER / DECKER (2012), p. 194-211; PREISER-KAPELLER (2018).

27 Winkelmann (1987); SETTIPANI (2006); COOPER / DECKER (2012), p. 213-252.

CE, Niketas Skleros served as admiral and diplomatic envoy to the Magyars at the mouth of the Danube. As imperial reward, they received additional landed property in Cappadocia and were integrated into the highest ranks of the imperial nobility (fig. 1).²⁸ By the middle of the 10th century, they had established ties of kinship with two other leading clans from the east – the house of Tzimiskes resp. Kurkuas and the clan of the Phokades. With Gregoria, Pantherios Skleros even married a member of a side line of the imperial dynasty of the Macedonians (see fig. 2).²⁹

During this period the minority of imperial heirs provided the opportunity for members of the military elite not only to act as wardens, but to seize imperial dignity for themselves and become the real power in Constantinople, first for Romanos I Lakapenos (also presumably of Armenian background) during the reign of Constantine VII between 913 and 944 CE and then for Nikephoros II Phokas for Basil II and Constantine VIII between 969 and 976 CE.³⁰ Although the “dynastic” claim of the Macedonians was maintained, the balance of power became more complex through the emergence of further “quasi-imperial” clans at the very centre of the networks of patronage and legitimation (fig. 2). The fragility of this framework became evident when in 969 CE Nikephoros II Phokas was assassinated and replaced as co-emperor and warden of Basil II and Constantine VIII by a member of the related clan of Tzimiskes-Kurkuas, John I (r. 969-976 CE). Through his first wife, John I Tzimiskes was the brother-in-law of Bardas and Constantine Skleros³¹, who now became his most trusted generals. But soon after their victory over the Rus in 970 CE mentioned above, they had to march to Cappadocia to put down the rebellion of Bardas Phokas, nephew of the murdered Emperor Nikephoros II and at the same time brother-in-law of Constantine Skleros.³² The Phokades were not prepared to accept their

28 SEIBT (1976), p. 24-25 (with sources and further references); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 5512 and 25717.

29 SEIBT (1976), p. 29-30 (with sources and further references); SETTIPANI (2006), p. 236-245; LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20886 and 22345, for the connection to the imperial dynasty; CHEYNET (2014), p. 188-189; CHEYNET (2008b), p. 473-497; ANDRIOLLO (2012), p. 57-87. For the visualisation and analysis of network models, I have used the software tool *ORA-LITE, available online (with detailed documentation) via <http://www.casos.cs.cmu.edu/projects/ora/software.php> (accessed on February 8, 2017). For the map I have used the (open access) software tool QuantumGIS (QGIS), available online via <http://www.qgis.org/de/site> (accessed on February 8, 2017).

30 KRESTEN / MÜLLER (1995); CHEYNET (2008b), p. 484. For doubts of the Armenian origin of the Lakapenos-family see now KALDELLIS (2019), p. 174-175.

31 SEIBT (1976), p. 29-30 (with sources and further references).

32 SEIBT (1976), p. 32-33, 58-59 (with sources and further references); CHEYNET (2014), p. 24-25 (nr. 6); CHEYNET (2008b), p. 486, 489; SETTIPANI (2006), p. 240-245; LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20784 (on Bardas Phokas).

removal from the centre of imperial power. The Skleroi were able to quell their revolt and Bardas Phokas was sent into exile, but the inherent potential for conflict among the enlarged network of imperial kin had become clear. In the next years, Bardas and Constantine Skleros rose to highest honours; at the same time they were able to establish themselves as focal point of loyalties of other members of the elites and via their leading role in the campaigns in the east also among the multitude of border lords on both sides of the frontier. This ended, when John I Tzimiskes unexpectedly and suspiciously died in 976 CE.³³ Neither Skleroi nor Phokades were now able to capture the position of a warden for the still young Macedonian emperors; it was a member of the Lakapenos-clan, the eunuch and *parakoimomenos* Basil, who did so (he was also suspected to have poisoned Tzimiskes) (see fig. 2). One of his first acts was the removal of Bardas Skleros from the high command of the all troops in Asia Minor and his installation as *dux* of Mesopotamia in only one section of the Eastern Frontier. Ostensibly, Bardas accepted this new position and travelled to the east, but he was already planning rebellion.³⁴

5 Dominant coalitions and the polarisation and fragmentation of elite networks

The following years would highlight even more the risks emerging from the dynamics of the dense elite network in this period for the very cohesion of the empire. Douglass C. NORTH, John Joseph WALLIS and Barry R. WEINGAST in their book on “Violence and Social Orders” have pointed out the general structural weakness of such a framework of power: “Patron-client networks not only structure the creation, gathering, and distribution of rents that can limit violence; the networks also structure and organize violence itself. When violence breaks out, it is typically among networks of elite factions. [...] The actual structure of dominant coalitions in natural states is inherently unstable. The dominant coalition regularly changes size and composition by weeding out weaker members and by incorporating new strong members and, rearranging the entire composition of the coalition. [...] When [...] dramatic adjustments are required, natural states often suffer partial or complete breakdowns in the dominant coalition, and civil war, rather than legal adjustments, can be the result.”³⁵

33 SEIBT (1976), p. 33-36 (with sources and further references LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20785 (on Bardas Skleros).

34 SEIBT (1976), p. 36-37 (with sources and further references); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20785 (on Bardas Skleros), nr. 20925 (on Basil Lakapenos).

35 NORTH / WALLIS / WEINGAST (2009), p. 30-31, 73; cf. also KAUTSKY (1997), p. 235-238.

In terms of network theory, such “adjustments in the dominant coalition” often go along with a polarisation between centres of gravity within the network of the elite.³⁶ This has been formalised by the physicist Mark E. J. NEWMAN with the concepts of “assortativity” and “disassortativity”. In assortatively mixed network, nodes with a high number of links tend to be connected to each other with a higher probability than with nodes with small degree values; the result is a dense core of well-connected nodes and a periphery of less well connected ones.³⁷ The core of the Byzantine elite in the second half of the 10th century with its closely interconnected clans of current and former emperors would have very much corresponded with such a model. Yet if links among the core nodes break down, a process of “dis-assortative mixing” is initiated, which results in a polarised network of various central hubs with their own respective periphery of nodes (in our case, kinsmen or clients). The assortativity respectively disassortativity of networks can be determined mathematically with a positive or negative “assortativity coefficient”.³⁸ Newman also developed several algorithms to identify groupings within such polarised networks; one of these proposes an “optimal” partition of a network into clusters (of nodes closely connected among each other), so that there are more links within these clusters than between them. Depending on the number of nodes in the network and the number of clusters identified, a modularity value (between 0 and 1) is determined for a network. But this algorithm also proposes an optimal partition between a previously fixed number of clusters, such as a division of nodes in two factions, depending on their structural position within the network. Newman applied these procedures for instance on a real-life data set for the network of a Karate-Club (of 34 members), where the polarisation of friendship ties around two popular instructors eventually had led to a break-up of the club. Newman determined a (dis)assortativity of this network of -0.48, which correlates well with the actual development of the club (tables 1a and 1b). The clustering-algorithm proposed an optimal partition in three clusters with a modularity value of 0.38. When the number of clusters into which the network should be divided was fixed with two, the attribution of nodes into the two clusters was identical with the two actual factions emerging after the collapse of the karate club, illustrating the strong contribution of structural parameters to group dynamics (fig. 3).³⁹

36 On processes of “polarisation” in the Roman elite of the late republic cf. also ROLLINGER (2014), p. 431-432.

37 NEWMAN (2002), 208701. Retrieved 10 September 2015: <http://arxiv.org/pdf/cond-mat/0205405.pdf>; NEWMAN (2006), p. 8577-8582; NEWMAN (2010), p. 220-231; PIRAVEENAN (2010); BARABÁSI (2016), p. 236-237, 253-256.

38 NEWMAN (2002); NEWMAN (2006).

39 NEWMAN (2006); NEWMAN (2010), p. 371-386; BARABÁSI (2016), p. 339-340.

I applied these tools and concepts on two data sets of networks of kinship within medieval elites⁴⁰, one including 166 members of the Byzantine aristocracy in the years 1313 to 1321 CE created by myself (on the basis of the *“Prosopographisches Lexikon der Palaiologenzeit”*, augmented with additional data⁴¹) and one connecting 897 clans of the Chinese elite through ties of marriage during the middle and late Tang dynasty in the 8th and 9th centuries CE created by Nicolas TACKETT for his monograph on *“The destruction of the Medieval Chinese Aristocracy”* (tables 1a and 1b). In both datasets, the ties of kinship respectively marriage are not reconstructed on the basis of genealogical studies (which may not guarantee their actual significance for interactions between these individuals respectively families), but explicitly mentioned as relevant for the social embedding of these nodes in the written sources. Therefore, these two datasets have been selected.⁴²

While Newman could use a complete data set of the Karate club, for the two historical networks, although emerging from big data sets for relatively well documented periods, we have to reckon with incomplete data. In order to take into account possible distorting effects, I also extracted a core group from each network, in the Byzantine case consisting of nodes with at least three kinship ties, in the Chinese of nodes with at least five links (tables 1a and 1b; figs. 4 and 5).⁴³ For the Byzantine elite, the assortativity coefficient is -0.2 for the entire kinship network and -0.09 for its core, thus indicating a relatively low degree of disassortativity and structural polarisation. This tendency is however significantly stronger for the Chinese elite clans network, with a value of -0.33 both for the entire network and its core (tables 1a and 1b). This correlates well with the detailed study of TACKETT (who did not apply Newman’s tools) of the network’s core, where he also identifies two “cliques” differing (among other things) in their focus on one of the two imperial capitals of that time (Chang’an or Luoyang), the intensity of their connection to the imperial clan and their ratio of clans of a background in the civil bureaucracy or the military of the empire

40 On the relevance of kinship and kinship networks cf. also GRAMSCH (2016), p. 89-92.

41 TRAPP et al. (2001). Cf. PREISER-KAPELLER (2015), p. 100-127, for more detailed information on the underlying data set.

42 TACKETT (2014), esp. p. 107-145 (also with online links to files with the underlying data). A data set based on large scale genealogical research would be the one on the Ragusan nobility genealogy provided by Vladimir Batagelj via <http://vlado.fmf.uni-lj.si/pub/networks/data/esna/ragusa.htm> (accessed on February 8, 2017); it contains 5,999 nodes (members of the Ragusan nobility from the 12th to the 16th century), 9,315 links of parent-child relations and 2,002 links of marriage. A network study based on this dataset would necessitate further research on which of these far-reaching webs had actual impact on social interaction beyond immediate consanguinity and marital links (thus actual relevance of kinship among cousins, for instance).

43 On these problems see also TACKETT (2014), p. 248-249.

(fig. 5).⁴⁴ The Byzantine network is however not less prone to fragmentation from a structural point of view; the modularity values for the entire network and its core are relatively high (0.70 respectively 0.61) and the Newman algorithm proposes an optimal partition into 8 respectively 5 clusters. Also the relatively high clustering coefficient (0.59) of the Byzantine core network indicates a strong structuring into more densely connected subgroups (tables 1a and 1b). This correlates well with the actual fragmentation of the Byzantine elite into factions in the period from 1321 CE onward, first during the civil war between Emperor Andronikos II Palaiologos (r. 1282-1328) and his grandson Andronikos III (r. 1328-1341) in the years 1321 to 1328 CE and later during the struggle between the imperial dynasty of the Palaiologoi and the powerful aristocrat John VI Kantakuzenos between 1341 and 1354 CE. These conflicts and factionalism very much contributed to the dramatic decline of Byzantine power in the 14th century CE.⁴⁵ For the Chinese elite clans TACKETT, in contrast, illustrates their high resilience towards political change from the period from the before the rise of the Tang in the 6th century until the 9th century CE⁴⁶; the strong disassortativity and also the high modularity value of the entire network of 0.72 seem to run counter these observations. Yet the modularity of the Chinese core is significantly lower than for both the entire Chinese network and the Byzantine core; the same is even more true for the clustering coefficient of the Chinese core in comparison with the Byzantine one (0.12 vs. 0.59) (tables 1a and 1b). Thus despite an overall tendency towards polarisation in the elite clans' marriage network, the structural potential for fragmentation is lower than in the Byzantine case.

As these results illustrate, the concepts of (dis)assortativity, modularity and clustering allow for comparative reflections on structural mechanisms behind the break-up of dominant coalitions in pre-modern polities across periods and regions. For actual attempts to quantify these phenomena, data density and sample size must of course be always taken into consideration.

6 The rebellion of Bardas Skleros, 976-979

While the density of evidence for the medieval Roman Empire in the 970s does not allow the application of these mathematical procedures, we may assume a similar process of disassortative polarisation among the elite network which enabled members of the new core group of "quasi-imperial" clans to emerge as competing centres of gravity for ties of patronage and allegiance. This became evident when Bardas Skleros, after his arrival in the East in 976 CE, finally had

⁴⁴ TACKETT (2014), p. 122-141.

⁴⁵ PREISER-KAPPELLER (2015); PREISER-KAPPELLER (2012), p. 69-127.

⁴⁶ TACKETT (2014), p. 141-145.

himself proclaimed emperor by his assembled followers and troops in the city of Melitene. If we inspect the network of his clients, we detect Bardas Skleros occupying a position similar to that of an emperor at the centre of the network, as a broker between several groups of the elite with different regional and ethnic backgrounds (fig. 6). This network also reflects the multifaceted character of nobilities at the Eastern frontier from which the Skleroi had emerged.⁴⁷ At the same time, it demonstrates the potential for network mobilisation at the periphery as recently highlighted by Navid HASSANPOUR.⁴⁸ Equally, we find an interesting parallel to rebels in imperial China such as An Lushan, himself of Sogdian-Turkic origin, who as frontier commander was able to establish his own network of clients and followers among the army and other commanders of foreign background at the periphery which allowed him to challenge the elites of the capital (whose network we inspected above) and the imperial regime in the centre in Chang'an in 755 CE.⁴⁹

The rebellion of Skleros found followers among the "Greek" elites in Central and Western Asia Minor, but also among Christian and Muslim Arab leaders in the region of Antioch in northern Syria, conquered only several years ago in the reigns of Nikephoros II and John I.⁵⁰ Bardas Skleros was also able to secure support from beyond the border to the Caliphate by the powerful Emir of Mosul Abū Taglib al-Ġaḍanfār b. Nāṣiraddawla, which was formalised with the establishment of kinship ties between the Skleroi and the family of the Emir. Followers on both sides of the border Bardas were found also especially among the Armenian nobility, from which the Skleroi themselves had originated (figs. 6 and 1).⁵¹ Their central position in Bardas' alliance is also evident from the description of his proclamation by the historian John Skylitzes:

47 SEIBT (1976), p. 37-38 (with sources and further references); CHEYNET (1996), p. 27-29 (nr. 11); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 200081 (on Abū Taglib) and 20785 (on Bardas Skleros); Kaldellis (2017), p. 83-84.

48 HASSANPOUR (2016), p. 1-26, who for instance argues (p. 15) that "marginal movers are less restricted in terms of their ability to convert their small social circle. Centrally located vanguards, on the other hand, are more constrained by the myriad sociopolitical connections that constitute their power, and cannot be as dynamic as the marginal ones."

49 PETERSON (1979), p. 464-560 (esp. p. 468-484) and p. 561-571; LEWIS (2009), p. 42-44, 58-59; PREISER-KAPPELLER (2018).

50 TODT / VEST (2014), p. 190-192.

51 SEIBT (1976), p. 37-44 (with sources and further references); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20736 (on Bagrat Taronites), 20785 (on Bardas Skleros), 22428 (on Gregorios Taronites) and 28501 (on Zap'ranik); CHEYNET (2014), p. 178. KALDELLIS (2019), p. 178-179, however doubts the relevance of ties of "ethnic" solidarity between the Skleroi and Armenian groups for the latter's mobilisation due to the integration of the former into the Roman/Byzantine elite during the generations before: "There is no reason to think that

"Now Bardas had openly declared what his intentions were; he donned the diadem and the rest of the imperial insignia and was proclaimed emperor by the entire Roman army there present, the Armenians leading the way in the acclamation."⁵²

The significance of the Armenian support was also recognized by Bardas' opponents; on the occasion of a defeat of one army of the Skleroi by imperial troops we read:

"Bourtzes was put to flight and many of those with him were slain, especially among the Armenians. In fact the Romans slew every Armenian they captured without quarter, for they had been the first to join the uprising."⁵³

This also indicates that the strong "non-Greek" share in Bardas Skleros' alliance may have alienated other members of the Byzantine elite. For earlier rebellions originating in the East, Byzantine historians had also accentuated the "alien" background of the insurgent's troops. Between 821 and 823 CE, Thomas the Slav for instance led an (unsuccessful) rebellion against Emperor Michael II in order to claim the throne for himself. According to the sources, his troops included "*Hagarenes, Egyptians, Indians, Persians, Assyrians, Armenians, Chaldeans, Iberians, Zechs, and Kabirs*", as well as "*Slavs, Huns, Vandals, Getes, Manichees, Lazes and Alans*". By listing all these ethnic and religious groups, the Byzantine historians tried to highlight the "barbarian" character of the insurgent as well as of his followers.⁵⁴ Thus, the ability to attract followers from many different backgrounds could also be used to disqualify such illegitimate alliances at the periphery from the perspective of the Roman imperial centre.

In addition, actual cohesion among some groups of Bardas Skleros network proved to be weak; from the beginning, it suffered from defections to the regime in Constantinople, which also made clever use of its still considerable symbolic as well as material capital in the form of promises of honours and property. Antioch, the capital of Byzantine Syria, was won and lost for Bardas within a

Skleros' choice of allies had anything to do with ethnic affinity, nor do our sources suggest anything like that. What we have is a rebel general mustering all the support that he could find". As we demonstrate in the following passage, however, the prominent position of the Armenians in the rebellion of Bardas Skleros is actually pointed out in our sources.

52 Ioannis Scylitzae *Synopsis historiarum*, ed. H. Thurn, Berlin et al., 1973, 16, 2; John Skylitzes. *A Synopsis of Byzantine History 811-1057*, transl. by J. Wortley, Cambridge, 2010, p. 300.

53 John Skylitzes, ed. Thurn [n. 52], 16, 5; transl. Wortley [n. 52], p. 305. On Bourtzes see LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 23930; CHEYNET (2008a), p. 339-376, esp. 344-345.

54 Signes CODOÑER (2014), p. 41, 45-52 (with reference to the sources); TREADGOLD (1988), p. 220-244; PREISER-KAPPELLER (2018).

few months, for instance.⁵⁵ But due to military successes over imperial generals sent against them, the Skleroi were able to maintain the allegiance of their core troops and to draw nearer towards the capital up to the city of Nicaea. In this situation, Basil *parakoimomenos*, the actual regent for the two Macedonian emperors, saw no other way than to re-activate the third player in this “game of throne”. As John Skylitzes writes:

“The parakoimomenos was greatly perplexed by all this (for Skleros was already on his way to the capital) and could produce only one adequate solution: to bring back Bardas Phokas from exile, thinking him to be the only effective antidote to Skleros. Quicker than it takes to tell he recalled him, secured his loyalty with oaths, showered him with wealth, raised him to the rank of magister and appointed him domestic of the scholai, then sent him out to do battle with Skleros.”⁵⁶

The strategy to counter the alliance of Bardas Skleros with the network of allegiance of the Phokades proved to be successful⁵⁷: after some failures, Bardas Phokas in 979 CE was able to defeat the Skleroi especially with the help of several thousands of Georgian troops provided by Prince Dawit III of Tao⁵⁸, who had become a friend of Bardas Phokas in the reign of his uncle when he had served as governor in the region. The Skleroi took refuge with several Muslim border lords and later at the court of the Caliph in Baghdad itself, where they were held in honour, as another example of noble mobility across the frontier.⁵⁹

7 The persistent “logics” of networking and social capital among imperial elites

For the imperial centre, the decision to fight fire with fire came at a price: Bardas Phokas now not only rose up to the level of his earlier honours, but was also able to entangle several of the followers of the Skleroi into his own network of

55 SEIBT (1976), p. 39-40 (with sources and further references); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 28392; TODT / VEST (2014), p. 192, 567.

56 John Skylitzes, ed. Thurn [n. 51], 16, 8; transl. Wortley [n. 51], p. 307; LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20784; CHEYNET (2008b), p. 489.

57 This is also the interpretation of the motivation for this move of Basil Parakoimomenos by KALDELLIS (2017), p. 85 (“The thinking was probably that his name and network would disrupt the loyalty of Skleros’ officers”).

58 SEIBT (1976), p. 42-48 (with sources and further references); BAUMGARTNER (1996); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20784 (on Bardas Phokas) and 21432 (on Dawit III of Tao); Kaldellis (2017), p. 85-86.

59 SEIBT (1976), p. 48-49 (with sources and further references); BEIHAMMER (2003); KALDELLIS (2017), p. 86-87.

patronage.⁶⁰ The delicate balance in the “dominant coalition” broke down again when Emperor Basil II finally freed himself from the de-facto regency of Basil Lakapenos (thereby alienating another powerful clan) and tried to enhance his prestige as warrior through a campaign against the Bulgarians, which ended in a major defeat. In this war, Basil II had passed over the noble commanders of his army in Asia Minor, namely the Phokades and their followers. This provoked Bardas Phokas in 987 CE to follow in the footsteps of Bardas Skleros and to proclaim himself emperor. At the same time, Bardas Skleros returned from Baghdad to Byzantine territory, once again planning to fight for the throne.⁶¹ Recognizing the superior position of Phokas, however, they two former foes came to an agreement: while Phokas would rule as emperor in the capital, Skleros should receive a realm of his own in the provinces in Syria and Mesopotamia, the territories which had also been the core of his earlier rebellion (fig. 1). This episode illustrates that members of the elites were starting to consider the establishment of quasi-independent dominions without aspiring for the throne in Constantinople, a phenomenon which would become much stronger in later periods of Byzantine history.⁶²

Yet this time, nothing of this came about; shortly afterwards, Bardas Phokas considered it more prudent to detain Skleros in a fortress. The Skleroi in turn had already sent Romanos, the nephew of Bardas, to Constantinople to arrange for a re-conciliation with the emperor.⁶³ Again, Phokas allied himself with several Armenian, Georgian and Muslim border lords beyond the frontier. Emperor Basil II was hard-pushed and only saved by the arrival of another group of mobile elite warriors: 6,000 Varangian mercenaries sent by his new brother-in-law, the prince of the Rus in Kiev Vladimir.⁶⁴ He successfully had countered the trans-border patronage network of Phokas with his own. Bardas

60 LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20784 (on Bardas Phokas); KALDELLIS (2017), p. 87-88.

61 SEIBT (1976), p. 49-51 (with sources and further references); CHEYNET (1996), p. 31-34 (nr. 15 and 16); CHEYNET (2008b), p. 489-490; LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20784 (on Bardas Phokas), 20785 (on Bardas Skleros); KALDELLIS (2017), p. 94-97.

62 SEIBT (1976), p. 51-53 (with sources and further references); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20784 (on Bardas Phokas), 20785 (on Bardas Skleros); KALDELLIS (2017), p. 96-97.

63 SEIBT (1976), p. 52-54 (with sources and further references); LILIE / LUDWIG / ZIELKE / PRATSCH (2014), nr. 20784 (on Bardas Phokas), 20785 (on Bardas Skleros).

64 POPPE (1976), p. 195-244; SEIBT (1976), p. 54-55 (with sources and further references); KALDELLIS (2017), p. 97-99.

Phokas died during battle in 989 CE and Bardas Skleros made his peace with the emperor soon afterwards.⁶⁵

As Catherine HOLMES (in contrast to earlier scholarship) has demonstrated, Basil II did not use his victory to suppress the great families; several members of the Skleroi and other clans entangled in the rebellions of the 970s and 980s again rose to high positions in the state.⁶⁶ But the emperor tried to limit the space of options for the establishment of potentially dangerous ties between his commanders in the east and potentates across the frontier by entrusting diplomatic relations there to civil functionaries from Constantinople, who established peace with the new power in Syria, the Fatimids.⁶⁷ Troops were free to be moved to the Balkans, where they fought the Bulgarians in the following decades under the personal command of Basil II, who now made his name as warrior emperor and “Bulgar-slayer”, re-strengthening the symbolic capital of the emperor as well as his position in the centre of the network of patronage and loyalties.⁶⁸ Basil II therefore acted within the established logics of the “dominant coalition”, embracing its warrior habitus.

Yet soon after Basil’s death in 1025 CE, when several factions in the administration of the capital and in the army in the provinces started to contest for power and less warlike emperors accessed the throne, again several representatives of the Anatolian military elite (among them also Skleroi) aspired for the imperial crown.⁶⁹ The 11th century was characterized by increasing unrest before and also after the Battle of Mantzikert in 1071 CE, where a Seljuk army defeated Emperor Romanos IV Diogenes. In the following round of civil wars, several factions in the tradition of earlier trans-frontier networking invited Turkish groups as allies, which led to the permanent loss of the interior of Anatolia for the empire and thus ultimately also to the end of the Cappadocian elite as factor within Byzantium (also the Skleroi disappeared from the highest ranks of the nobility). The new frontiers between Byzantium and the Muslim world now criss-crossed Asia Minor, and again they became stage of frequent mobility of nobilities across political and religious borders, of patronage and treason, of power display and the definition of common grounds for the purpose of communication.⁷⁰ The arrival of the Crusaders from the West, who

65 Grünbart (2008), p. 213-224; Lilie / Ludwig / Zielke / Pratsch (2014), nr. 20784 (on Bardas Phokas), 20785 (on Bardas Skleros); Kaldellis (2017), p. 98-99.

66 SEIBT (1976), p. 62-65 (with sources and further references); HOLMES (2005). Along these lines now also KALDELLIS (2017), p. 115-116.

67 HOLMES (2005), p. 299-390; KALDELLIS (2017), p. 116-117.

68 HOLMES (2005), p. 392-390; STEPHENSON (2003).

69 SEIBT (1976), p. 71-85 (with sources and further references); CHEYNET (1996), p. 38-110 (listing 127 rebellions in the years from 1025 to 1081 CE); PREISER-KAPPELLER (2016), p. 130-195.

70 Cf. BEIHAMMER (2017).

immediately had to join the game, further enriched the scenery, but this is beyond the scope of the present paper.

8 Conclusion

The by now almost notorious question might be asked, what this chapter has been able to show with its use of social network analysis that would otherwise have remained invisible. The following concluding passages intend to provide an answer to this legitimate query.

As Anthony Kaldellis has stated recently, “civil wars in Byzantium (...) were focused around individuals, never ideologies”.⁷¹ Thus, it is essential to deploy concepts and tools which allow us to systematically survey, map and analyse these individuals and their social ties in order to unravel some of the underlying mechanisms of political conflicts. This is especially true when the amount of data would not allow for doing so in a traditional “linear” narrative as in the case of the 14th century Byzantine elite discussed (in comparison with Tang China) above; here the construction of a network graph opens an illuminative view on the patterns of social structure emerging from the multitude of information in our sources, but otherwise hidden. Quantitative analysis permits a further characterisation of these patterns (especially also in comparison), which provide the “infrastructure” for re-negotiation of influence and power within the “dominant coalition” (for this term, see above).⁷² Limited density of evidence, however, restrains the usage of the full analytical array for the elite networks of 10th century Byzantium⁷³. Still, the application of concepts and (visualisation) tools of social network theory (and the demonstration of their validity for other periods in the history of the Byzantine polity where more elaborate models can be built) allows for a more informed interpretation of the source evidence with regard to the “faded patterns” (to borrow a term from Robert GRAMSCH) and dynamics of power. In the case of Bardas Skleros, it equally facilitates to counter the “Constantinople-centrism” of Byzantine historiography with a perspective of “leading from the periphery”, with its specific traditions of network formation across political, ethnic and religious boundaries.⁷⁴

Equally, the application of the common repertoire of network theory and network analysis eases the overcoming of disciplinary boundaries. It provides an analytical framework for the comparison of the emergence, dynamics and conflicts of elites in pre-modern empires without the necessity to use (also now

71 KALDELLIS (2017), p. 87.

72 See also PREISER-KAPPELLER (2015).

73 This is true even when a much higher number of prosopographical data is used for this period as demonstrated recently by MORDECHAI (2017).

74 HASSANPOUR (2016); GRAMSCH (2016).

fiercely debated) concepts developed for medieval western Europe such as “feudalism”.⁷⁵ Studies such as the book by Carmen WINKEL on „Networks and Patronage in the Prussian Army“ of the 18th century CE, which shows considerable similarities in the underlying mechanisms of network creation and polarisation between royal patron and noble clients from within and beyond the polity’s borders, equally illustrate potentials for longitudinal studies.⁷⁶ With a combination also of older concepts of social theory with the new tools of network visualisation and (if the evidence is sufficient) quantification the validity of these theories can be validated or modified. Equally, the “strange parallels” (to borrow a term from Victor Lieberman) of the fragility (or resilience) of the network formations of “dominant coalitions” as well as the considerable diversity between pre-modern polities can be highlighted in a new way.⁷⁷ All of this justifies the theoretical and technical efforts demonstrated in this and other chapters of the present volume.⁷⁸

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⁷⁵ Cf. REYNOLDS (1994).

⁷⁶ WINKEL (2013).

⁷⁷ LIEBERMAN (2009).

⁷⁸ For a critical evaluation, see also the contribution of Giovanni Ruffini to this volume.

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10 Appendix

	Number of nodes	Number of links	Av. path length	Max. path length	Density
Karate Club	34	78	2,48	5,00	0,14
Byzantine Elite kinship 1313-1321	107	166	4,49	11,00	0,03
Byzantine Elite kinship 1313-1321 (core)	43	90	3,62	8,00	0,10
Tang China elite clans marriage 8th/9th cent.	897	1056	5,15	15,00	0,003
Tang China elite clans marriage 8th/9th cent. (core)	93	192	3,70	10,00	0,05

	Assortativity	Modularity	Clustering Coefficient	Degree Centralisation	Betweenness Centralisation
Karate Club	-0,48	0,38	0,57	0,40	0,41
Byzantine Elite kinship 1313-1321	-0,20	0,70	0,27	0,18	0,54
Byzantine Elite kinship 1313-1321 (core)	-0,09	0,61	0,59	0,20	0,36
Tang China elite clans marriage 8th/9th cent.	-0,33	0,72	0,01	0,02	0,45
Tang China elite clans marriage 8th/9th cent. (core)	-0,33	0,44	0,12	0,08	0,40

Tables 1a and 1b: selected network measures of network models discussed in the text

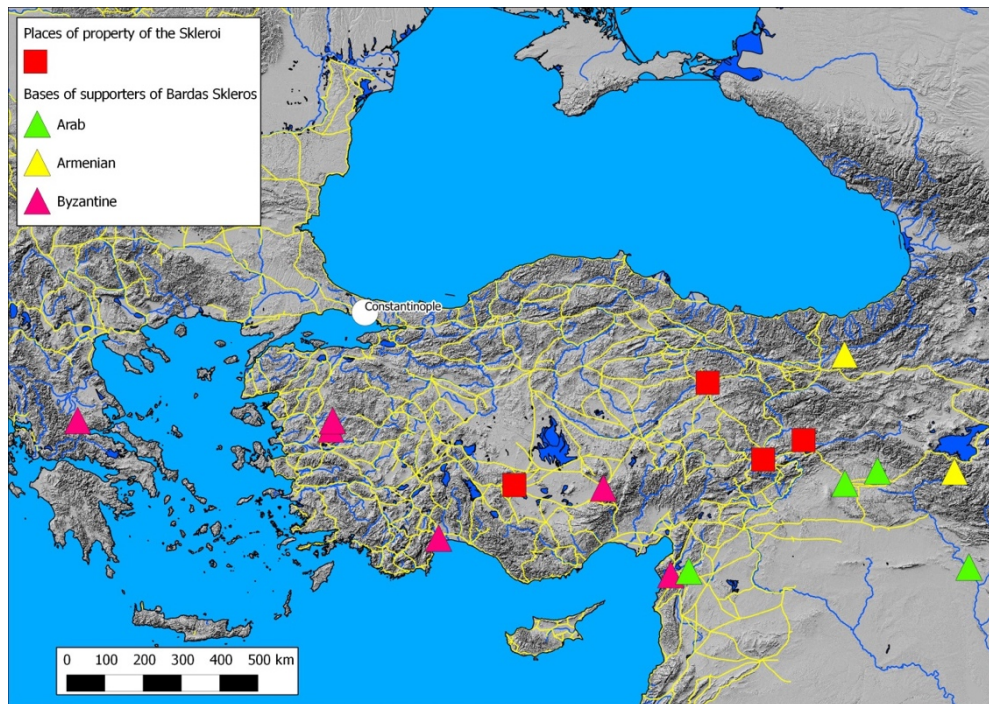


Fig. 1: Map: Places of property of the Skleroi in the 10th century CE and bases of supporters of Bardas Skleros in 976-979 CE (J. Preiser-Kapeller, 2016).

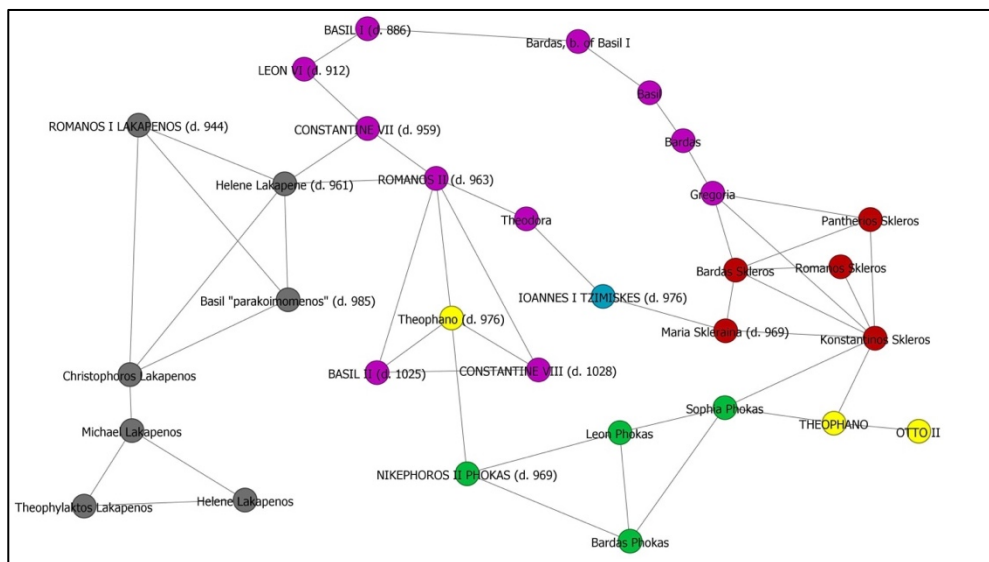


Fig. 2: Kinship connections between members of the imperial dynasty ("Macedonians", purple nodes) and the clans of the Skleroi (red nodes), the Phokades (green nodes), the Kurkuas-Tzimiskes (blue nodes) and the Lakapenoi (grey nodes) in 10th century CE Byzantium (J. Preiser-Kapeller, 2016).

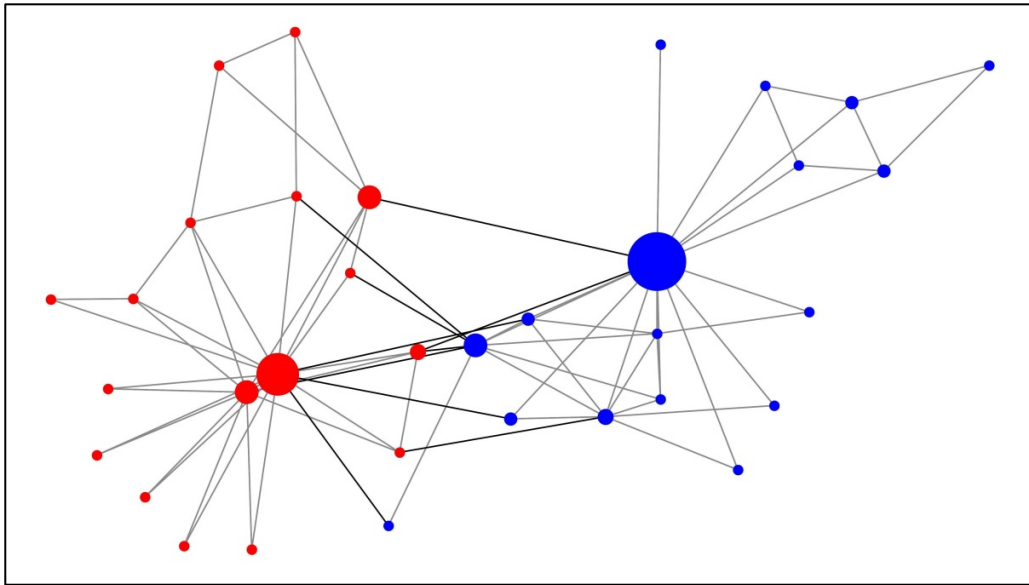


Fig. 3: Network model of a Karate club; nodes are sized according to their betweenness-centrality and coloured according to their attribution to two clusters with the Newman-algorithm (data: NEWMAN, Modularity and community structure [n. 37]; graph: J. Preiser-Kapeller, 2016).

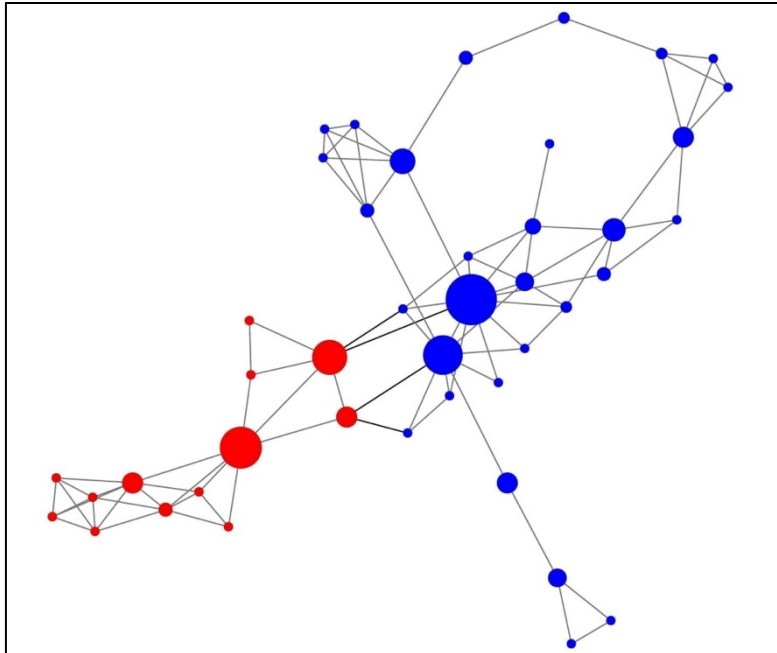


Fig. 4: The core of the kinship network of the Byzantine elite in 1315-1321 CE; nodes are sized according to their betweenness-centrality and coloured according to their attribution to two clusters with the Newman-algorithm (J. Preiser-Kapeller, 2016).

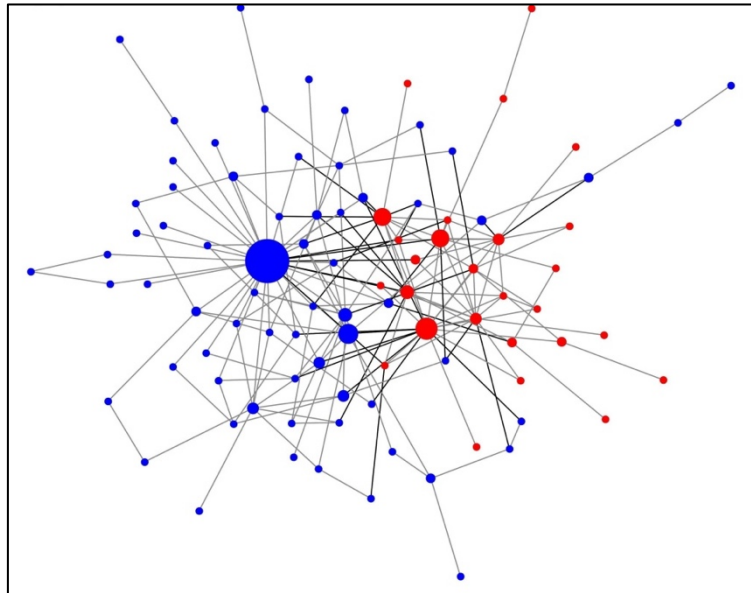


Fig. 5: The core of the marriage network of clans of the central elite in Tang China, 8th-9th centuries CE; nodes are sized according to their betweenness-centrality and coloured according to their attribution to two clusters with the Newman-algorithm (data: TACKETT, *The Destruction* [n. 42]; graph: J. Preiser-Kapeller, 2016).

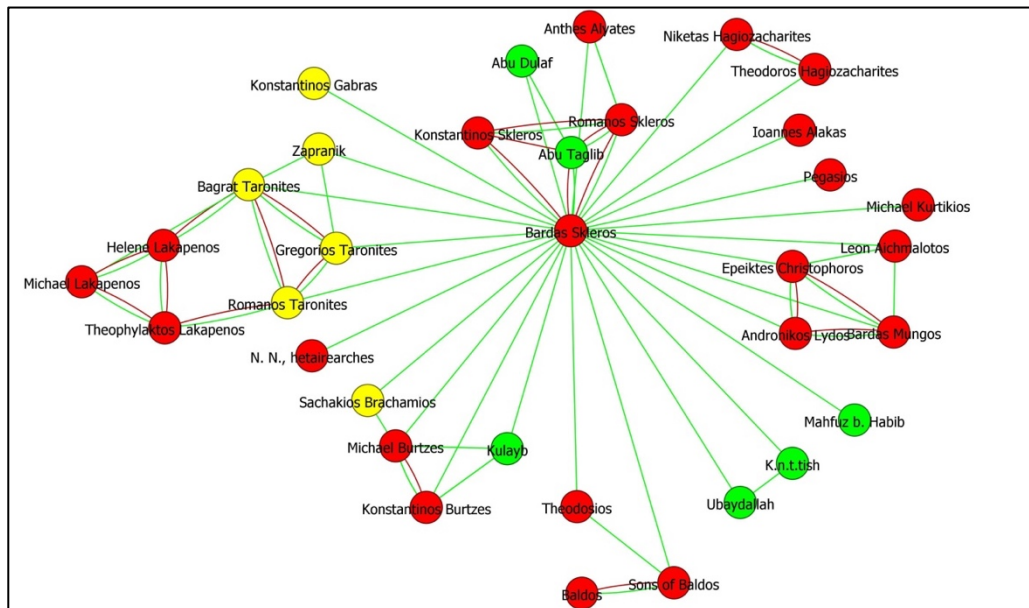


Fig. 6: The network of supporters of Bardas Skleros during this rebellion in 976-979 CE; red node: Byzantines, green nodes: Arabs, yellow nodes: Armenians; green links indicate ties of allegiance and support, red links ties of kinship (J. Preiser-Kapeller, 2016).