More structure? – Types of structured doctoral programmes in Germany

SVEA KORFF

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Stiftung Universität Hildesheim
Forschungscluster | Hochschule und Bildung
Institut für Sozial- und Organisationspädagogik und
Institut für Erziehungswissenschaft – Abteilung
Allgemeine Erziehungswissenschaft
Universitätsplatz 1, 31141 Hildesheim

Tel.: +49 (0)5121 883 11750
E-Mail: sopas@uni-hildesheim.de
Web: www.hochschuleundbildung.de

Satz und Gestaltung:
Svea Korff: svea.korff@uni-hildesheim.de

Herausgeber:
Forschungscluster | Hochschule und Bildung
Universitätsplatz 1, 31141 Hildesheim

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Table of Contents

Summary

1 Introduction 1
2 Structured doctoral programmes at German institutes of higher education 2
3 Methodological implementation 5
3.1 Data 5
3.2 Method 5
3.3 Operationalisation 6
4 Three types of „structured“ doctoral programmes 8
4.1 Institutionale attributes of the three types 10
4.2 Social demographics of doctoral students compared by type 11
4.3 Comparison of compulsory activities among the types 12
5 Conclusion: more structure? 14

References 16

Summary

Investigations into the level of structure on doctoral programmes are few and far between, and there are no definitions of what this proclaimed structure means. The following paper[1] starts out from precisely this desideratum by attempting to typologise doctoral programmes by their structuring characteristics. The question which led our research was that of how structure can be operationalised to reveal the differences between the various programmes. Methodologically, this was carried out using a nationwide, multidisciplinary online survey deploying cluster analyses as a method of identifying structures prior to typologising them.

Zusammenfassung

Untersuchungen, die sich mit dem Grad der Strukturiertheit von Promotionsprogrammen auseinandersetzen, sind rar gesät. Es ist nicht definiert was diese proklamierte Struktur bedeutet. Der folgende Beitrag[2] setzt genau an diesem Desiderat an, indem er eine Typenbildung von Promotionsprogrammen anhand strukturierender Merkmale vornimmt. Forschungsleitend war dabei die Frage, wie die Struktur operationalisiert werden kann, um Unterschiede zwischen verschiedenen Programmen aufzeigen zu können. Methodisch umgesetzt wurde dies anhand einer deutschlandweiten, fächerübergreifenden Online-Befragung indem zur Typenbildung Clusteranalysen als strukturentdeckendes Verfahren eingesetzt wurden.

[1] This paper is a revised and translated version of a chapter in the study "Lost in Structure" (Korff 2015).

[2] Dieses Paper ist eine überarbeitete und übersetzte Fassung eines Kapitels der Studie „Lost in Structure“ (Korff 2015).

1 Introduction

Until now, little research has been carried out into structured doctorates and the situation of early-career academics during the doctoral stage. Dedicated investigations into the structuring of such structured doctoral programmes, such as research training groups, graduate schools or doctoral courses, are even rarer. There is neither a definition of what these proclaimed structures mean, nor has there been any attempt to systematise doctoral programmes according to their structural characteristics and the consequences of those characteristics. The following paper starts out from precisely this research desideratum, attempting to typologise doctoral programmes according to structuring features such as the application process, the number of supervisors, compulsory cooperation, the number of seminars on offer and their financing or opportunities for employment during the doctoral phase. The question which led our research was that of how the *structure* of structured doctoral programmes can be operationalised to reveal the differences between the various programmes in terms of their level of structure. Methodologically, this was carried out using a nationwide, multidisciplinary online survey of doctoral students and graduates, deploying cluster analysis as a method of identifying structures prior to typologising them. The three resulting types of programme show clearly that the *structure* of the structured doctoral support is a continuum ranging from less structured to highly structured programmes.

2 Structured doctoral programmes at German institutes of higher education

While individual doctorates tend to be discussed in terms of their deficits (they are said to lack stringency, orderliness and transparency), the discourse on structured doctoral programmes in Germany suggests that structured doctorates can help with these issues (Oppermann/Schröder 2013). "On the whole, leaving doctoral candidates to their own devices and just offering them individual supervision no longer stands up to the requirements of modern society and also gets in the way of creating a European system of higher education" (Reichert/Tauch 2003, p. 8). What are known as "structured" doctoral programmes are intended to be the driving force behind joint research by creating new potential which can stand up to the competition (Fiedler/Hebecker 2006, pp. 11f.; Bosbach 2009, p. 19; Hauss et al. 2010, p.76). Structuring the doctoral phase is a competition-based strategy which is not only limited to European research (Williams 2005; Kehm 2007; Nerad/Heggelund 2008; Andres et al. 2015). The introduction of structured doctoral programmes was and is still also connected to other hopes: it is meant to react to the rising number of doctorates, to create greater equality of opportunity, to counter the high dropout rate, to shorten excessively long PhDs and to improve insufficient networking and transparency. Above all, this relates to the difficulties early-career researchers have positioning themselves on the academic labour market. The overall aim is to strengthen Germany as a location for research (Allmendinger/Schorlemmer 2010; Mau/Gottschall 2008; Wintermantel 2010; Korff/Roman 2013; Andres et al. 2015).

During the structural reforms of policy on general and higher education in Germany, the American PhD model was used as a example of how the doctoral phase could be structured as part of the third cycle of the 1999 Bologna process and the Lisbon strategy (Lisbon Summit 2000). This is a model which is and was said to have a clear structure, not only because of the formal components of an obligatory course phase, which is often cited in Germany by critics of the excessive "schoolification" of doctorates (Hauss/Kaulisch 2012). In other words, the traditional pursuit of a doctorate "in solitude and freedom" (Schelsky 1963; Engler 2001; Tiefel 2006) was supplemented by doctoral training with differing degrees of structure, on doctoral programmes such as research training groups, graduate schools or doctoral courses (Bosbach 2009). "Optimistically, those whose decisions make them responsible for the current situation describe it as a 'variety of pathways to a doctorate' which need to be maintained [...]" (Moes 2010, p. 42). The aim is thus not to replace the traditional pathway

to a doctorate in Germany with a structured version, but instead to propagate the diversification of doctoral models. These different models are to be maintained, extended and, above all, improved upon (Bosbach 2009, p. 115). American studies have already shown that developing a general model to support fledgling academics can be problematic as (1) graduate programmes are decentralised, meaning that it is hard to determine the general corresponding factors which affect their progress, (2) graduate programmes are less structured than undergraduate courses and (3) graduate programmes are grouped by discipline, which also leads to differences (Ferrer de Valero 2001). In Germany, equally, the system for structured doctorates is neither fully developed (Mau/Gottschall 2008, p. 3) nor uniform, as the term "structured doctorate" encompasses various models with different levels of structure (Bosbach 2009; Korff 2015).

The call for greater stringency, orderliness and transparency brings with it the difficulty of comparing this diverse range of models. There are, for example, investigations analysing individual and structured doctorates in their context: doctorates as part of research projects, within a university institution or externally, compared with research training groups, graduate schools and doctoral courses, and looking at the conditions of those doctorates and terms of employment (Berning/Falk 2006; Jaksztat et al. 2012; Enders/Kottmann 2009). While Enders und Kottmann (2009) investigate how conditions for qualification in the research training groups of the German Research Foundation (DFG) differ from the context in which candidates who follow other pathways gain their qualifications (see also Kottmann/Enders 2010), Hauss, Hornbostel und Kaulisch (2010) compare the structural characteristics of the supervisory model of individual doctorates with the model used for structural doctorates – or look into the paths leading to a PhD in Germany, their structure and their conditions by examining the level of structure of the doctorate, how they are supervised, where funding comes from and what situation doctoral graduates can expect on the employment market, as well as the internationalisation of doctoral training (Hauss et al. 2012). The final study identified different types of doctoral programme based on supervisory practices such as the number of supervisors, the frequency of consultations with the supervisor, any doctoral agreements made and whether graduates attended accompanying courses (ibid, p. 80). This was, however, an exception: the other investigations mainly associate different programme designations with different types of structure (Herz et al. 2012).

Research question

At first, the procedure suggests itself of viewing traditional and structured doctorates as two end points of the same continuum, and analysing them comparatively. Wergen (2011), for example, who differentiated between doctoral formats according to the degree to which they are structured, categorised individual doctorates as having a low level of structure compared with structured doctorates (ibid., p. 237). Herz und Korff (2013),

meanwhile, were able to prove that when structured doctoral programmes are typologised – taking into account the characteristics of "compulsory activities during the doctorate" (work) and the "regulation of attendance periods" (time) – students on individual doctoral programmes do not form their own structural type but are scattered across the typological table and can be found within all the different types. From this point of view, structured doctorates thus do not always mean more structure, and individual doctorates do not automatically mean less (ibid., 2013, p. 96).

Nonetheless there seems to be a shared understanding of what exactly a structured doctoral programme is and the features (e.g. structural features) which necessarily have to be negotiated (Oppermann/Schröder 2013). The characteristics which are investigated in these studies and used to compare doctoral models are always the same: (1) supervision practices, (2) curricularisation and/or teaching of key qualifications, (3) the selection and admission process, (4) the development of national and international cooperative associations and (5) doctoral financing or employment during the doctoral phase (Enders/Bornmann 2001; Wissenschaftsrat 2002; Hüttel 2005; Berning/Falk 2006; BMBF 2013; Enders/Kottmann 2009, Hauss et al. 2012, Herz et al. 2012; Korff/Roman 2013; Korff 2015). Until now, however, these characteristics have not been used together for the purpose of typologising.

This paper thus focuses on the internal differences between structured doctoral programmes (Herz et al. 2012). Nonetheless, to support the results, there will then be a brief final comparison of individual doctorates and structured programmes. The understanding of "structure" used for typologising refers to the above features, taken from the discourse on structured doctoral programmes and the state of the research on the level of structure and the organisation or reorganisation of PhDs in Germany. The following will explore the question of how the structure of structured doctoral programmes can be operationalised to make them comparable and reveal the differences between the various programmes of this type.[3]

[3] An analysis of the level of structure in doctoral programmes, in the context of students' thoughts of dropping out of structured doctoral programmes, can be found in the study "Lost in Structure" (Korff 2015).

3 Methodological implementation

3.1 Data

The data used for the following analyses come from a standardised online survey of PhD students and graduates carried out during the project "Chance:Docs"[4] funded by the Federal Ministry of Education and Research (BMBF). The national, interdisciplinary survey drew responses from n = 1,649 PhD students and graduates. The participants were contacted using snowball sampling (Gabler 1992), for example via their doctoral programme coordination office or representatives and their e-mail addresses, discovered in the lead-up to the study by means of standardised website analysis (Korff/Roman 2013). After data cleaning, a sample of n = 1,165 cases was then available for subsequent analysis (1,081 "structured" doctorates and 84 individual doctorates). In the sample, 46 % of respondents came from the field of mathematics and the natural sciences (n = 491) and roughly another 21% each from linguistics and cultural studies (n = 221) and law, economics and the social sciences (n = 225). In addition, more of the PhD students taking part in the survey were female (61 %, n = 655) than male (39 %, n = 426). Looking at how the respondents are distributed across the federal states it can be seen that most are from Lower Saxony[5] (21 %), followed by Baden-Württemberg (19 %), North Rhine-Westphalia (17 %) and Bavaria (9 %).

3.2 Method

In the field of the research subject and research question examined in this case, the method of cluster analysis was an appropriate means of exploration and, above all, of revealing structure. Based on the doctoral students' statements about their PhD programmes, this method was used to categorise the programmes into clusters which were as homogeneous as possible in terms of the characteristics examined, and at the same time as heterogeneous as possible within each category. The aim of this was to create a typology of doctoral programmes on a firm empirical basis (Wiedenbeck/Züll 2001; Backhaus et al. 2008). The cluster analyses were based on the cleaned sample of responses with n = 1,081 cases from the

[4] The project behind this publication, "Equal Opportunities within German PhD programs – Gender and Diversity" was funded from 2008–2012 by the Federal Ministry of Education and Research and the European Union's European Social Fund under grant number 01FP0836/37. The responsibility for the content of this publication is in the hands of the author.

[5] The high proportion of respondents from Lower Saxony may be due to the research project's regional connection.

online survey. A test for outliers using the single-link (closest-neighbour) method identified 7 cases which would have skewed the results and were thus excluded from the analysis.[6] The initial sample had n = 1,040 cases, 679 cases of which went into the final analysis; these contained all the information required on the variables used.

3.3 Operationalisation

To operationalise the structure of doctoral programmes, the variables from the dataset were selected which sufficiently described the doctoral programmes with regard to the goal of the investigation.

In the online survey, the doctoral students and graduates were asked to indicate which of the named *application or selection methods* they had to go through to gain access to their doctoral programme (multiple response set). The dummy variables "written application", "interview", "admission test", "assessment centre" and "other admission process" were given a value of (1) if the entry process applied and (0) if it did not. Following the definition of the discourse on structured doctorates generates the *hypothesis* that the more structured a doctoral programme is, the more likely that a competitive selection process will be used (Berning/Falk 2006; Hauss et al. 2012). The dummy variable "I did not have to go through any selection process" corresponds with the other variables in the selection process and was thus excluded from the analysis as a reference category. Another classification attribute used in the analysis was the "number of supervisors", in an attempt to reconstruct any *supervisory structure* which appeared, divided into a single supervisor, two supervisors and a supervisory team. This is based on the *hypothesis* that structured programmes are characterised by intensive departmental supervision (a supervisory team). In other words, the more structured a doctoral programme is, the more supervisors support the doctoral student's research project (Hauss et al. 2010; Hauss et al. 2012). Another quantitative variable used in the typology was the "number of additional modules", to reveal differences in terms of the "schoolification" of the doctoral phase. According to this *hypothesis*, the more extensive the number of taught modules, the more structured the doctoral programme (Scheiterer 2008; Hauss/Kaulisch 2012). In addition, the dummy variable "cooperation with other academics outside the programme" was included in the analysis, with this variable having a value of (1) if the surveyed doctoral student indicated that this was compulsory and a value of (0) if it was not compulsory, but voluntary. This comes from the *hypothesis* that structured programmes place greater value on supporting academic exchange by means of national and international *cooperation*, another aim being to make doctorates in Germany more nationally and internationally compatible and attractive (Hauss et al.

[6] Medical students (n = 34) were also excluded from the analysis for reasons related to the content of their doctorate such as the specific type, duration, conditions and the need for a PhD for a career in this field ((DUZ)-SPECIAL 2004, p. 124; Berning/Falk 2006, p. 22; Burkhardt 2008, p. 131 ff.).

2012). Finally, the variable "employment situation regarding the programme" was included in the typology, as there is good reason to believe that doing a doctorate while in employment gives a different kind of access to the academic infrastructure than doing a doctorate on a scholarship. The *hypothesis* is that the *type of financing* or the lack of any financial (or social) security could turn out to be an element structuring a certain type of doctoral model (Korff et al. 2011, p. 16; Moes 2010, p. 48). The nominal variable with multiple levels was divided into five dummy variables for the analysis: the variables were given a value of (1) for "doctorate financed via a position on the programme", "doctorate financed via a position outside the programme", "doctorate financed via a scholarship on the programme", "doctorate financed via an external scholarship" or "doctorate financed by other means", and a value of (0) if none of these financing types applied. As the response "No financing for the doctorate" corresponds with the other levels of the variables, it was excluded from the analysis as a reference category.[7]

[7] As mixed-scale classification attributes were used in the cluster analysis, the quantitative variables were standardised using z scores in the hierarchical cluster analysis.

4 Three types of „structured“ doctoral programmes

The doctoral students' responses about their doctoral programmes were categorised into groups using cluster analysis, and a three-cluster solution appeared (see Table 1). An interpretation of this cluster is shown in Table 1, which depicts the attributes of the different clusters compared as row percentages. This table shows the percentage (%), the number (n) and, in cases with the number of supervisors and events available, the mean values (M). The different types of structured doctoral programmes emerging from this are first described in terms of the classification attributes, then their composition is examined considering other attributes such as the composition of the syllabus, the distribution across the different faculties, the programme designations and how the programmes are made up in terms of the sociodemographic attributes of the students and graduates in each type.

Table 1: Comparison of cluster attributes among types (row percentages)

Items	Cluster I (n=195)		Cluster II (n=191)		Cluster III (n=293)	
	%	n	%	n	%	n
Admission process						
Written application	27.8	168	27.3	165	44.9	271
Interview	27.8	136	25.4	124	46.8	229
Admission test	10.2	6	20.3	12	69.5	41
Assessment centre	26.7	4	40.0	6	33.3	5
Other	26.3	10	26.3	10	47.4	18
Number of supervisors						
(*M*)	2		1		3	
Cooperation with other academics outside the programme						
	20.8	30	29.9	43	49.3	71
Number of events available						
(*M*)	3		6		7	
Employment situation during the doctoral programme						
Position on the programme	33.0	32	29.9	29	37.1	36
Position outside the programme	22.8	28	34.1	42	43.1	53
Scholarship on the programme	31.2	112	24.2	87	44.6	160
External scholarship	25.0	15	30.0	18	45.0	27
Other	20.8	5	37.5	9	41.7	10

Note: results of cluster analysis using Ward's method followed by K-means optimisation.

Table 2: Events available within each type (multiple response were possible)

	Cluster I (n=195)		Cluster II (n=191)		Cluster III (n=293)	
	%	n	%	n	%	n
Doctoral colloquium	82.5	156	96.9	185	97.3	284
Special lectures / seminars	80.5	153	94.7	180	99.0	289
Methodological seminar / workshops	61.9	117	94.7	178	96.0	281
Events on academic work	63.1	118	99.5	188	99.7	292
Research management modules	16.1	29	78.4	145	88.1	252
Interdisciplinary research colloquia	44.7	80	89.1	163	91.6	263
Practical and career-related events	12.2	22	76.2	141	85.0	244
Other events	1.0	2	3.7	7	5.5	16

The three following types of structured doctoral programmes can be depicted/described from the information given by the doctoral students and graduates surveyed:

Type I: open-entry programmes (for "internal" candidates)

This type is characterised by a two-supervisor model (M = 1.76). Another characteristic feature of this type is that the doctorate is financed by means of scholarships (31 %) and positions on the programme (33 %). Access to the programme is usually via transparent selection processes consisting of written applications followed by interviews. The amount of compulsory cooperation with other academics outside the programme tends to be low in this type (21 %). The number of additional modules which PhD students of this type are able to use is limited to three or four (M = 3.47) teaching units (see Table 1) and mainly consists of doctoral colloquia, special lectures and seminars for doctoral candidates, methodological seminars or workshops, and events related to academic work (see Table 2).

Type II: curriculum-led programmes (for "external" candidates)

Doctoral students in this type are largely supported by single supervisors (M = 0.70). With six events accompanying their doctorate, they have quite a wide range of possibilities (M = 6.22; see Table 1). Doctoral students can attend events such as doctoral colloquia or interdisciplinary colloquia, special lectures and seminars for PhD students, methodological seminars or workshops, and events related to academic work and research management (see Table 2). Similarly to the first type, entry to the programme requires a transparent selection process using written applications followed by interviews, some accompanied by admission tests or assessment centres. In this type, doctoral students tend to be financed by external positions (34 %) and scholarships (30 %). The amount of compulsory cooperation is thus higher than in the first cluster, applying in 30 % of cases.

Type III: performance-led (community) programmes

In this type of programme, support is provided by supervisory teams with an average of 3 supervisors (M = 2.64, see Table 1). With seven events, the

number of activities to accompany the doctorate (M = 6.56) covers the widest range, meaning that as well as conventional activities (see Type II), doctoral students can also attend events which are linked to practice and their career (see Table 2). Entry to this type of programme takes place not only in the form of transparent processes such as written applications followed by interviews but also in the form of competitive selection processes such as tests or assessment centres. Cooperation outside the context of the programme is considered extremely important (see Table 1), and this type of programme is generally financed by means of scholarships (45 % internal and 45 % external) (see Table 1).

Once the three types of structured doctoral programmes have been distinguished, it is now possible to describe correspondences to the doctoral students' institutional and individual attributes, as well as going further/deeper into the specifics of the conditions on the programme by examining what are known as additional "compulsory activities during the doctorate".

4.1 Institutional attributes of the three types

When further differentiating between the three types of structured doctoral programme, if mathematics and the natural sciences are ignored, then this leaves "open-entry programmes (for internal candidates)" in the field of linguistics and cultural studies and "curriculum-led programmes (for external candidates)", usually in the field of law, economics and the social sciences "Performance-led (community) programmes", by contrast, are most commonly found in mathematics and the natural sciences. There is a low but significant level of correlation between the types and the faculties ($\chi^2(6, n = 678) = 15.17$, $p = .02$, Cramer's $V = .11$; see Table 3).

Table 3: Distribution of departments within the types of structured doctoral programmes (column percentages)

	Cluster I (n=195)		Cluster II (n=191)		Cluster III (n=293)	
	%	n	%	n	%	n
Linguistics and cultural studies	24.2	47	18.9	36	19.5	57
Law, economics and the social sciences	20.1	39	25.1	48	13.3	39
Mathematics and the natural sciences	46.4	90	46.6	89	53.6	157
Other departments	9.3	18	9.4	18	13.7	40

Examining the three structuring types further with regard to the distribution of the different programme designations (see Table 4), a significant, moderate correlation is found ($\chi^2(16, n = 679) = 56.21$, $p = .00$, Cramer's $V = .20$). Open-entry programmes (for internal candidates) are most frequently assigned to the designation "research training group". Curriculum-led programmes (for external candidates) are most frequent in "graduate schools". Here, however, the designation "doctoral course" should also be noted: this is used less frequently in the other two types. Finally,

the designation "graduate schools" is most likely to apply to "performance-led (community) programmes".

Table 4: Distribution of programme designations within each type (column percentages)

	Cluster I (n=195)		Cluster II (n=191)		Cluster III (n=293)	
	%	n	%	n	%	n
Research training group (“Graduiertenkolleg”)	35.4	69	22.0	42	25.3	74
Graduate school (“Graduiertenschule”)	19.5	38	27.7	53	38.6	113
Graduate college (“Promotionskolleg”)	6.2	12	7.9	15	3.4	10
PhD programme (“PhD-Programm”)	10.3	20	8.9	17	16,0	47
Research school (“Research School”)	10.3	20	7.3	14	4.4	13
Doctoral programme (“Promotionsprogramme”)	4.5	9	7.8	15	3.5	10
Centre for doctoral training (“Doktorandenkollegs”)	1.5	3	2.1	4	2.0	6
Doctoral course (“Promotionsstudiengang”)	9.2	18	12.6	24	3.4	10
Other	3.1	6	3.7	7	3.4	10

4.2 Social demographics of doctoral students compared by type

Comparing three types of structured doctoral programmes also means that differences can be revealed between the doctoral students and graduates who have gained a doctorate in the different types, based on attributes such as sex, age, number of children, social origins and any background of immigration (see Table 5).

Table 5: Social demographics of doctoral students compared by type

		Cluster I (n=195)		Cluster II (n=191)		Cluster III (n=293)	
		%	n	%	n	%	n
Sex (%)	Women	66.7	130	57.6	110	61.8	181
	Men	33.3	65	42.4	81	38.2	112
Age (M)		30.0	194	29.8	191	29.6	291
Number of children (M)		1.3	18	1.3	17	1.3	23
Educational background (%)	Acad. hh	69.7	139	64.4	123	65.5	192
	Non-academic household	29.7	58	34.0	65	32.4	95
Background of immigration (%)	yes	13.8	27	29.5	56	24.3	71
	no	86.2	168	70.5	134	75.7	221

Male doctoral students tend to be found in "curriculum-led programmes (for external candidates)" (Cluster I: 33 %, Cluster II: 42 %, Cluster III: 38 %, total: 38 %, n = 258), while women tend to gain a doctorate in "open-entry programmes (for internal candidates)" (Cluster I: 67 %, Cluster II: 58 %, Cluster III: 62 %, total: 62 %, n = 421). However, no significant correlation was found between the structuring of the programme and the sex of the doctoral students ($\chi^2(2, n = 679) = 3.38$, $p = .18$, Cramer’s $V = .07$). Neither were any significant differences found between the types in terms of age ($F(2, n = 673) = 0.90$, $p = .41$, $\eta^2 = .00$) (Cluster I: M = 30.0, SD = 3.58, Cluster II: M = 29.8, SD = 4.12, Cluster III: M = 29.6, SD = 3.37). On average, doctoral

students in all three types are 30 years old. There were also no signs of any significant correlation in terms of differences regarding the number of children ($F(2.55) = 0.12$, $p = .98$, $\eta^2 = .00$). On average, doctoral students in all three types of structured programme have 1.3 children. Regarding the educational background[8] of the doctoral students surveyed, it can be said that the "open-entry programmes (for internal candidates)" show signs of somewhat greater inequality in terms of educational background in comparison with "curriculum-led programmes (for external candidates)" and "performance-led (community) programmes", with a ratio of 70/30. However, no correlation could be proved ($\chi^2(4, n = 679) = 2.94$, $p = .57$, Cramer's V = .05). Doctoral students with a background of immigration (30%) are more likely to be found in "curriculum-led programmes (for external candidates)" than in "open-entry programmes (for internal candidates)" or "performance-led (community) programmes" (Cluster I: 14 %, Cluster II: 30 %, Cluster III: 24 %). This was the only attribute with a moderate and highly significant correlation ($\chi^2(2, n = 677) = 14.09$, $p = .00$, Cramer's V = .14). Though there are only some initial signs of this, there does seem to be less inequality in terms of origins (educational background and a background of immigration) on "structured" programmes (in Clusters II and III) than on "open-entry" programmes (Cluster I).

4.3 Comparison of compulsory activities among the types

Doctoral students' situation within the three types of structured doctoral programme can be described well in terms of the compulsory activities which they have to carry out during their doctorate, i.e. in addition to it (see Table 6). For this description, an additive index was created to show the number of compulsory activities in the types ($M = 3.30$, $SD = 2.44$, min = 0, max = 13, n = 1,026). Altogether there is not a great deal of difference between the average activities to be carried out in each type. While "open-entry programmes (for internal candidates)" require three additional activities to be carried out ($M = 3.36$, $SD = 2.59$), there are four compulsory activities on "curriculum-led programmes (for external candidates)" ($M = 3.99$, $SD = 2.67$) and "performance-led (community) programmes" ($M = 3.75$, $SD = 2.46$). No significant correlation was proven between the three types of structured doctoral programmes and the number of compulsory activities during the doctorate ($F(2,676) = 3.02$, $p = .05$, $\eta^2 = .01$).

However, even though no noteworthy differences appeared regarding the number of activities, the "type of activities" does allow some conclusions to be drawn about structuring and the consequences this has for doctoral students (see Table 6). Students on all three types of structured doctoral programmes indicated most frequently that they had to take part in a compulsory doctoral colloquium (Cluster I: 82 %, Cluster II: 79 %, Cluster

[8] The "educational background" was generated from the variables "mother's highest educational qualification" and "father's highest educational qualification". To create a dichotomous variable, the categories "one academic parent" and "two academic parents" were subsumed under the term "academic household".

III: 80 %). In order of most frequent mentions, the next activity was publications on their own academic work (Cluster I: 52 %, Cluster II: 59 %, Cluster III: 59 %), attending conferences (Cluster I: 44 %, Cluster II: 50 %, Cluster III: 51 %) and lecturing at conferences (Cluster I: 44 %, Cluster II: 48 %, Cluster III: 47 %).

A difference only appears on closer inspection of activities carried out in the field of teaching and research. Here, it can be seen that – compared with students from the other types of programme – doctoral students on "curriculum-led programmes (for external candidates)" most frequently named independent teaching (40 %), assisting with teaching (26 %), supervising students (41 %) and working on project applications (23 %) as compulsory activities during their doctorate. On "performance-led (community) programmes, by contrast, it is cooperation with other academics (26 %), work experience and study abroad (8 %) and research and teaching abroad (13 %) which students name the most frequently as compulsory activities compared with students on other types of structured doctoral programmes. The only aspect which students on "open-entry programmes (for internal candidates)" named more frequently than on other types of programme was compulsory attendance of a doctoral colloquium.

Table 6: Comparison of compulsory activities during the doctorate by type of structured doctoral programme

	Cluster I (n=169)		Cluster II (n=174)		Cluster III (n=269)	
	%	n	%	n	%	n
Independent teaching	30.8	52	39.7	69	34.9	94
Assisting with teaching	20.7	35	26.4	46	18.2	49
Supervising students	29.0	49	40.8	71	31.6	85
Working on project applications	20.7	35	23.0	40	15.2	41
Publications on own academic work	52.1	88	58.6	102	59.1	159
Attending conferences	44.4	75	50.0	87	51.3	138
Lectures at academic conferences	43.8	74	47.7	83	46.5	125
Organising conferences and workshops	23.7	40	26.4	46	20.1	54
Attending doctoral colloquium	81.7	138	78.7	137	80.3	216
Cooperating with other academics	17.8	30	24.7	43	26.4	71
Work experience and study abroad	5.9	10	5.7	10	7.8	21
Research and teaching abroad	11.8	20	10.3	18	13.4	36
Taking part in academic self-governance	4.7	8	5.7	10	3.7	10
Other	0.6	1	-		-	

5 Conclusion: more structure?

Creating a typology based on the attributes of the admission process, the number of supervisors, compulsory cooperation, the number of seminars available and financing or employment during the doctoral phase proved to be of benefit. On one hand, the structural attributes created maximum heterogeneity among the three types, while on the other hand it was also possible to identify other attributes among the types, such as differentiating them by department, designation and their focus on research or teaching. Now, the findings can be used to put the types in order, illustrating the different levels of structure in structured doctoral programmes. Based on the benchmarks of the generally shared understanding of structured doctoral programmes in the discourse and emerging from the state of the research, "performance-led (community) programmes" prove to be the type with the most organisational stipulations:

Gaining a doctorate on a "performance-led (community) programme" involves competitive admission tests, supervisory teams, an average of seven activities during the doctorate and funding in the form of scholarships. By contrast, gaining a doctorate on a "curriculum-led programme (for external candidates)" involves fewer competitive tests than on "performance-led (community) programmes", though this deficit is balanced out by the use of assessment centres. This type "only" has single supervisors, though there is more compulsory cooperation with other academics within the programme. The number of activities accompanying the doctorate (six) is similarly high to "performance-led (community) programmes", and students of this type are mostly funded via positions or scholarships outside the programme. Gaining a doctorate on an "open-entry programme (for internal candidates)" comes last in terms of level of structure. Two supervisors are provided, and most admission processes are transparent, with little competition. These programmes offer the lowest number of activities for students, and tend to have an equally low level of compulsory academic exchange in the form of cooperation. Here, financial support mostly comes in the shape of positions and scholarships within the programme.

Operationalising the structure of individual and structured doctorates proved to be of little benefit: clustering students on individual doctoral programmes based on the attributes of competitive selection processes, intensive departmental supervision, national and international cooperation and formalised, clearly structured doctorates involving a curriculum showed that only 40 out of a total of 181 cases were included, meaning

that it was not possible to draw any conclusions on a firm empirical basis. Berning und Falk (2006) compare the traditional (German) doctorate with other characteristics such as the American PhD model: they distinguish between the individual doctorate – the "master/pupil model", which usually involves a student being dependent on a professor – and the structured model in which a team of professors and/or an organisational structure (connection to a programme, institute or faculty) provide funding and supervision. The status of doctoral students varies between membership of the non-professorial teaching staff, in the case of a traditional doctorate, and a status as students on structured programmes. In the case of selection, a distinction can be made between informal and formal or transparent and competitive selection processes, while the content of the programme can be distinguished according to whether it has a high or low level of formalisation.

Nonetheless, it can be said that it does not seem to make sense to view individual and structured doctorates as two end points of the same continuum. All doctoral models can be understood as a continuum regarding their structure. The three resulting types of programme show clearly that the *structure* of the structured doctoral programme is a continuum ranging from less structured to highly structured programmes.

References

Allmendinger, J./Schorlemmer, J. (2010). Karrierewege in der wissenschaftlichen Nachwuchsförderung. Das Geschlecht macht einen Unterschied. In M. Wintermantel (Eds.), Promovieren heute. Zur Entwicklung der deutschen Doktorandenausbildung im europäischen Hochschulraum (pp. 124–136). Hamburg: edition Körber-Stiftung.

Andres, L./Bengtsen, S. S. E./Castaño, L. G./Crossouard, B./Keefer, J. M./Pyhältö, K. (2015). Drivers and Interpretations of Doctoral Education Today: National Comparisons. Frontline Learning Research, 3(3), pp. 5–22.

Backhaus, K./Erichson, B./Plinke, W./Weiber, R. (Eds.) (2008). Multivariante Analysemethode. Eine anwendungsorientierte Einführung. Berlin: Springer.

Berning, E./Falk, S. (2006). Promovieren an den Universitäten in Bayern. Praxis – Modelle – Perspektiven. Retrieved February 8, 2014, from http://www.ihf.bayern.de/uploads/media/ihf_studien_hochschulforschung-72.pdf

Bundesministerium für Bildung und Forschung (2013). Bundesbericht zur Förderung des Wissenschaftlichen Nachwuchses (BuWiN). Bonn: Bundesministerium für Bildung und Forschung.

Bosbach, E. (Eds.) (2009). Von Bologna nach Boston? Perspektiven und Reformansätze in der Doktorandenausbildung anhand eines Vergleichs zwischen Deutschland und den USA. Leipzig: Akademische Verlagsanstalt.

Burckhardt, A. (Eds.). (2008). Wagnis Wissenschaft. Akademische Karrierewege und das Fördersystem in Deutschland. Leipzig: Akademische Verlagsanstalt.

(DUZ)-SPECIAL (2004). Zur Situation Promovierender in Deutschland. Ergebnisse der bundesweiten THESIS-Doktorandenbefragung 2004. Beilage zur duz (3. Dezember 2004), 1-32.

Enders, J./Bornmann, L. (Eds.) (2001). Karriere mit Doktortitel? Ausbildung Berufsverlauf und Berufserfolg von Promovierten. Frankfurt a.M: Campus Verlag .

Enders, J./Kottman, A. (2009). Neue Ausbildungsformen – andere Werdegänge? Ausbildungs- und Berufsverläufe von Absolventinnen und Absolventen der Graduiertenkollegs der DFG. Weinheim: WILEY-VCH Verlag.

Engler, S. (2000). Zum Selbstverständnis von Professoren und der illusio des wissenschaftlichen Feldes. In B. Krais (Eds.), Wissenschaftskul-

tur und Geschlechterforschung. Über die verborgenen Mechanismen männlicher Dominanz in der akademischen Welt (pp. 121–152). Frankfurt am Main: Campus Verlag.

Ferrer de Valero, Y. (2001). Departmental Factors Affecting Time-to-Dedree and Complation Rates of Doctoral Students at One Land-Grant Research Institution. The Journal of Higher Education, 72, 341-367.

Fiedler, W./Hebecker, E. (Eds.) (2006). Promovieren in Europa. Strukturen, Status und Perspektiven im Bologna-Prozess. Opladen: Barbara Budrich.

Gabler, S. (1992). Schneeballverfahren und verwandte Stichprobendesigns. ZUMA-Nachrichten, 31(16), 47-69.

Hauss, K./Gerhardt, A./Mues, C. (2010). Unterschiedliche Promotionsformen, gleiche Probleme? Analysen zur Unterbrechung von Promotionsvorhaben. Beiträge zur Hochschulforschung, 32(2), 76-95.

Hauss, K./Kaulisch, M. (2012). Alte und neue Promotionswege im Vergleich. Die Betreuungssituation aus der Perspektive der Promovierenden in Deutschland. In N. Huber, A. Schelling & S. Hornbostel (Eds.), Der Doktortitel zwischen Status und Qualifikation (pp. 163-172). Berlin: Institut für Forschungsinformation und Qualitätssicherung.

Hauss, K./Kaulisch, M./Zinnbauer, M./Tesch, J./Fräßdorf, A./Hinze, S./Hornbostel, S. (2012). Profile der Promotion. Die Doktorandenausbildung an deutschen Universitäten. Bonn: iFQ Working Paper.

Hauss, K./Kaulisch, M./Hornbostel, S. (2010). Neue Strukturen gleich bessere Betreuung? Eine erste Bestandsaufnahme aus dem Promovierendenpanel ProFile. In M. Wintermantel (Eds.), Promovieren heute. Zur Entwicklung der deutschen Doktorandenausbildung im europäischen Hochschulraum (pp. 110–124). Hamburg: edition Körber-Stiftung.

Herz, A./Korff, S./Roman, N. (2012). Strukturiert, aber gerecht? Auf der Spur nach Strukturen in Programmen strukturierter Promotion. Erziehungswissenschaften, 45, 46–60.

Herz, A./Korff, S. (2013). Promovieren in strukturierten Promotionsprogrammen aus Sicht der AdressatInnen – Ergebnisse der standardisierten Online-Befragung. In S. Korff & N. Roman (Eds.), Promovieren nach Plan? Chancengleichheit in der strukturierten Promotionsförderung (pp. 75–116). Wiesbaden. Springer VS.

Hüttl, R. F. (2005). Kernelemente für eine Neugestaltung der Promotionslandschaft. Core elements for a new structure of doctoral education. Hochschule Innovativ, 14, 12–13.

Jaksztat, S./Preßler, N./Briedis, K. (2012). Promotionen im Fokus. Promotions- und Arbeitsbedingungen Promovierender im Vergleich. Hannover: HIS.

Kehm, B. M. (2007). Quo Vadis Doctoral Education? New European Approaches in the Context of Global Changes. European Journal of Education, 42(3), 307-319.

Kottmann, A./Enders, J. (2010). Vorbild Graduiertenkolleg? Die DFG-Graduiertenkollegs der 1990er-Jahre im Vergleich mit anderen Promotionswegen. In M. Wintermantel (Ed.), Promovieren heute. Zur Entwicklung der deutschen Doktorandenausbildung im europäischen Hochschulraum (pp. 53–67). Hamburg: edition Körber-Stiftung.

Korff, S./Oppermann, C./Roman, N./Schröder, J. (2011). Bleibt alles anders? – Chancengleichheit in der strukturierten Promotionsförderung an deutschen Hochschulen. In B. Blätter, A. Franzke & A. Wolde (Eds.), Neue Karrierewege für Frauen an der Hochschule? (pp. 143–161). Sulzbach: Ulrike Helmer.

Korff, S./Roman, N. (Eds.) (2013). Promovieren nach Plan? Chancengleichheit in der strukturierten Promotionsförderung. Wiesbaden. Springer VS.

Korff, S. (Eds.) (2015). Lost in Structure? Abbruchgedanken von NachwuchswissenschaftlerInnen in der strukturierten Promotion. Wiesbaden. Springer VS:

Kreckel, R. (2012). Die Forschungspromotion. Internationale Norm und nationale Realisierungsbedingungen. In N. Huber, A. Schelling & S. Hornbostel (Eds.), Der Doktortitel zwischen Status und Qualifikation (pp. 141–160). iFQ-Working Paper No. 12. Retrieved August 5, 2016, from www.forschungsinfo.de/Publikationen/Download/working_paper_12_2012.pdf

Lisbon Summit (2000). European Council, 23 and 24 March 2000, Lisbon Presidency conclusions Retrieved August, 2016, from http://www.europarl.europa.eu/summits/lis1_de.htm

Mau, S./Gottschall, K. (2008). Strukturierte Promotionsprogramme in den Sozialwissenschaften. Soziologie, 37, 41–60.

Moes, J. (2010). Die strukturierte Promotion in Deutschland. In M. Wintermantel (Eds.), Promovieren heute. Zur Entwicklung der deutschen Doktorandenausbildung im europäischen Hochschulraum (pp. 42-52). Hamburg: edition Körber-Stiftung.

Nerad, M./Heggelund, M. (Eds.) (2008). Toward a Global PhD? Forces and Forms in Doctoral Eduvcation Worldwide. Seattle: University of Washington Press.

Oppermann, C./Schröder, J. (2013). Die Rezeptur der strukturierten Promotionsförderung oder der Wandel muss kommen – eine diskursanalytische Rekonstruktion der Konstrukte „strukturierte Promotionsförderung“ und „Chancengleichheit“. In S. Korff & N. Roman (Eds.), Promovieren nach Plan? Chancengleichheit in der strukturierten Promotionsförderung (pp. 15–39). Wiesbaden: Springer VS.

Reichert, S./Tauch, C. (2003). Trends 2003. Fortschritte auf dem Weg zum Europäischen Hochschulraum. Retrieved August 5, 2016, from www.eua.be/Libraries/higher-education/zusammenfassung-1064413695906.pdf

Scheiterer, U. (2008). Concluding Summary. From Fellows Function: Research, the Knowledge Economy, and the Features of Doctoral Education. Higher Education in Europe, 33(1), 149–157.

Schelsky, H. (Eds.) (1963). Einsamkeit und Freiheit. Idee und Gestalt der deutschen Universität und ihrer Reformen. Reinbek bei Hamburg: Rowohlt.

Tiefel, S. (2006). Promovieren in Kollegs und Zentren: Entwicklung, Zielsetzungen und Angebote verschiedener Modelle strukturierter Promotion in Deutschland. In C. Koepernik, J. Moes & S. Tiefel (Eds.), GEW-Handbuch Promovieren mit Perspektive. Ein Ratgeber von und für DoktorandInnen (pp. 252–264). Bielefeld: W. Bertelsmann.

Wegen, J. (2011). Forschung und Förderung: Promovierende im Blick der Hochschulen. Berlin: Lit Verlag.

Wiedenbeck, M./Züll, C. (2001). Klassifikation mit Clusteranalyse: Grundlegende Techniken hierarchischer und K-means-Verfahren. Retrieved August 5, 2016, from http://www.gesis.org/unser-angebot/publikationen/archiv/gesis-how-to/

Williams, G. (2005). Doctoral Education in Canada, 1900-2005. Retrieved August 5, 2016, from http://www.cags.ca/documents/publications/working/doctoral_education_canada_1900-2005.pdf

Wintermantel, M./André, J./Mayer, M./Schneider, F. (2010). Promovieren heute. Zur Entwicklung der deutschen Doktorandenausbildung im europäischen Hochschulraum. Hamburg: edition Körber-Stiftung.

Wissenschaftsrat (2002). Empfehlungen zur Doktorandenausbildung. Retrieved Febraury 5, 2014, from www.wissenschaftsrat.de/download/archiv/5459-02.pdf

CLUSTER PAPER 2|2017