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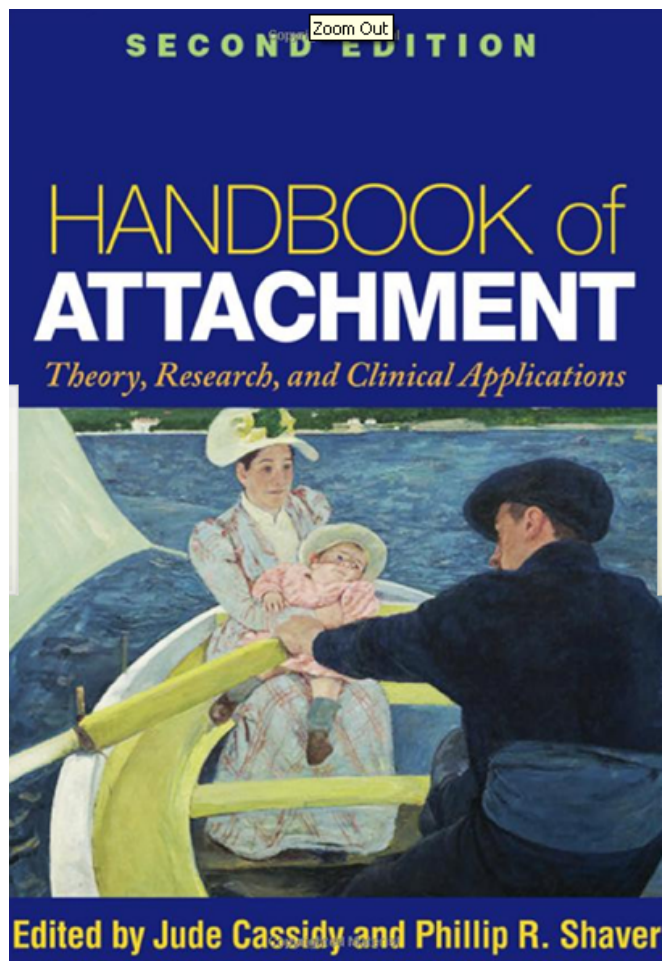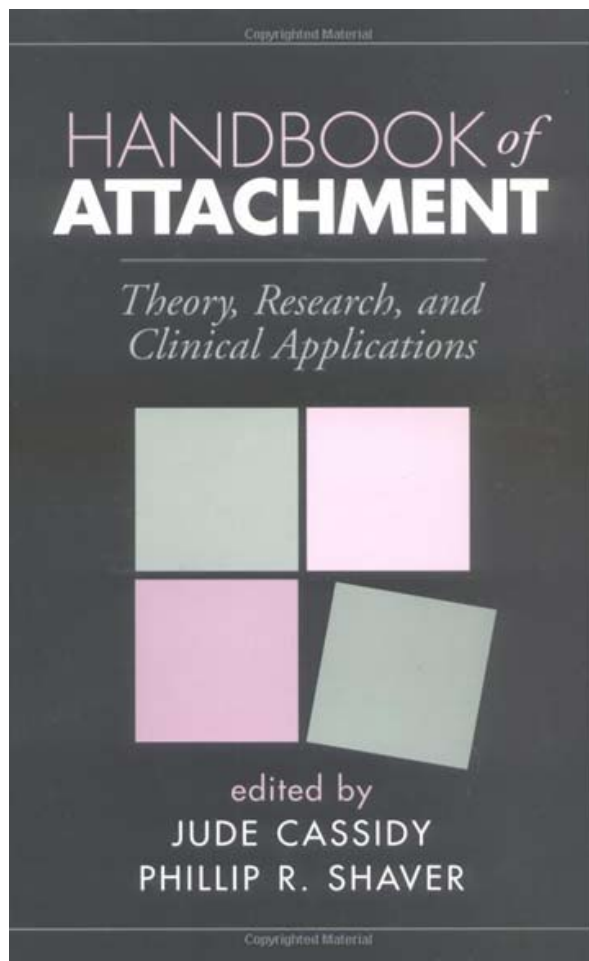
The World of Attachment seen through the eyes of the *Handbooks of Attachment*

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Abstract

The *Handbooks of Attachment* represent authoritative collections of state-of-the-art reviews of the whole spectrum of attachment research. In this paper these handbooks are used to present a detailed quantitative view of the major research areas and the leading researchers in the field, as well as their relationships. The results are based on frequency of citations, co-authorships and numbers of papers referenced in the chapters of the handbooks. They show that a detailed network of attachment researchers exists and that it is getting denser. Major areas of attachment research have been relatively stable in the last decade.

Keywords: *Attachment, developmental research; clinical applicatio;, adult attachment style; quantitative review; multidimensional scaling; correspondence analysis*

Introduction

The field of attachment is a vigorous research area with a long tradition which started with the pioneering work of Bowlby (1969, 1973, 1980) and Ainsworth (1964,1967). A sign of the maturity of the research field was the appearance of the *Handbook of Attachment* in 1999 which provides an in-depth view of the state of the art of attachment research (Cassidy & Shaver, 1999; for its contents see Appendix B). Google Scholar lists around 700 mentions to the complete book itself, and the total number of citations to the papers in the *Handbook* is about 7400 or 200 per chapter on average with a range of 17 – 585 (Retrieved 27/9/2009; for details per chapter see Appendix B) . In their Preface the editors state that "It seems unlikely that either John Bowlby […], or Mary Ainsworth […] dreamed for a moment that their theoretical efforts would spawn one of the broadest, most profound, and most creative lines of research in 20th-century psychology." (p. x). About ten years later the second edition of the *Handbook of Attachment* appeared (Cassidy & Shaver, 2008; for its contents see Appendix C) increasing the number of chapters from 37 to 40, and increasing the number of pages from 888 to 974. As the reason for this increase the editors noted in their introduction to the second edition, that "[..] psychology has moved in the direction of neuroscience and behavioral genetics" (p. xii), which necessitated the additional chapters. Translational research, i.e. putting theory into clinical practice via intervention studies was a reason for an increase as well. The aim of the editors for the editions of the *Handbook* was to cover the most important areas in attachment research and to have overviews presented by leading researchers in the various subdomains. As formulated by Mary Ainsworth, the godmother of the attachment theory: "This [first edition of the] *Handbook* is certain to be a rich source of information and ideas for years to come, providing experts with solid reviews of topical areas, and helping newcomers understand what has been accomplished and what remains to be done. Attachment researchers have a great deal to be proud of -- and many exciting directions to pursue"[1].

The stated purpose of the *Handbooks* is to satisfy professional needs for knowledge about Bowlby's and Ainsworth's writing, to present results from subsequent research, and to describe which measures have been developed and what they measure (Cassidy & Shaver, 2008).

The *Handbooks* aim to provide representative, fairly complete both historic and state-of-the-art reviews of the field of attachment. The authoritativeness derives from the breadth of their

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[1] This quote was found on *http://www.amazon.co.uk/Handbook-Attachment-Research-Clinical-Applications/dp/1572308265* (Retrieved 22/4/2009), whether it is also published elsewhere is unknown to us.

coverage, the standing and expertise of the chapter authors, and the sources relied upon in these volumes. Because of their standing the *Handbooks* can be used a basis for exploring how the field of attachment and the researchers working in it are organised and linked. In other words they give a view on the World of Attachment, who lives in it, how they are related and what are their main interests. The aim of this paper is to provide such a view in terms of its inhabitants and their major areas of research.

The basic information for this endeavour are the bibliographic references at the end of the chapters and the author indices. In particular, one may use the number of citations to a specific author in a chapter as an indication of the relevance of this author's work to the topics discussed in the chapter. If an author is cited in all chapters the work of the author is relevant to all areas of attachment research. If an author is only cited in a single chapter, her or his work is primarily relevant for the topics discussed in the chapter in question. Furthermore, the references per chapter also allow the investigation of the relatedness of research domains, as researchers working in related domains will tend to be cited in chapters dealing with these domains.

Another view of the world of attachment can be acquired by examining co-authorship as it can provide insight into the productive relationships between authors. Joint publications are indicative of common interests and cross-fertilisation, but they are only a sufficient indication. Mutual inspiration and influence do not necessarily have to result in joint publications. Bowlby, the founding father of attachment research, is a case in point. The two ways of investigating publications, i.e. examining citations in chapters and examining co-authorships, are providing different perspectives on the world of attachment.

This paper aims to give an overview of the world of attachment, especially its researchers and their networks, the subjects they study, and how this world has changed over the past decade. The investigation is structured around a number of questions: The first question is directed towards the examination of the web of linkages between researchers (*Who has published with whom?*). This allows the identification of so-called *spiders*, i.e. the researchers who are central in this web. The next and most important question is the determination of the characteristic domains in attachment research and which researchers and spiders are mostly strongly associated with those domains (*Who published what?*). Because we have two editions of the *Handbook* about a decade apart we can pose the question in which way the world of attachment has changed in the past decade both with respect to joint research and the fields that are being investigated (*How has the world of attachment changed?*)

Method

Data collection and research questions

Who is included?
The first and second editions of the *Handbook of Attachment* are the basic data sources being considered in this paper. As is evident from the author indices at the end of the volumes a large number of researchers are cited in the *Handbooks* so that it was impossible to include all of them in this study. Moreover, we were after the more influential investigators in attachment research, so that we decided to limit ourselves to those researchers mentioned most often in the author indices. There are certain limitations to this approach as we will discuss in detail below. In order to make a selection we counted the number of times a person was mentioned in the author index and decided somewhat arbitrarily to only include those authors who were cited on 30 pages or more in either *Handbook* (i.e. 3.4% and 3.1% of the relevant pages of the two *Handbooks*, respectively; for details per author see Appendix A).

Who published with whom?
To answer this question we counted how often papers of the selected authors were cited basing ourselves on the reference lists at the end of each chapter. In particular we counted the numbers of

times articles of two joint authors were listed in each of these reference lists, and then added these numbers over all chapters of each *Handbook*. The data form a square matrix with authors as rows and the same authors as columns. A cell of the matrix for author A and author B contains the number of times that A and B's joint papers appear in the chapter reference lists (see Figure 1, left-hand panel). Using joint authorship it is possible to establish which researchers are central in the *Web of Attachment,* i.e. which authors are the spiders, where spiders are defined as authors who have at least six co-authors who also belonged to our selected authors.

Who published what?
This question could be answered by checking in the reference list of each chapter how often articles of a particular author were cited irrespective the order in the author list. The data form a cross-tabulation of authors by chapters with in the cells authors' citation frequencies per chapter (see Figure 1, right-hand panel). The basic idea behind these data is that the chapters in the *Handbooks* each represent a particular domain in attachment theory, so that many citations in a chapter indicate that the work of the author is relevant for the subject areas treated in that chapter. Especially the spiders' research domains are of particular interest.

Research question	*Who published with whom?*	*Who published what?*
Data format	Similarity matrix of authors by authors Authors by authors table with rows A, B, C and columns A, B, C: cell (A,A)=x, (A,B)=f_{AB}, (B,A)=f_{BA}, (B,B)=x, (C,C)=x $f_{BA} = f_{AB}$ = number of times papers written by (co-)authors A and B have been cited in an entire *Handbook*.	Cross-tabulation of authors by chapters Authors by chapters table with rows A, B, C and columns 1, 2, 3: cell (B,2)=f_{B2} f_{B2} = number of papers of which author B was a co-author cited in Chapter 2. (f_{A2} ,f_{B2} ,f_{C2}) is the profile of Chapter 2; (f_{B1},f_{B2},f_{B3}) is the profile of Author B
Analysis technique	Multidimensional scaling	Correspondence analysis

Figure 1. Overview of data structures, research questions and analysis methods.

How has the world of attachment changed?
Because we have information from both *Handbooks* which are about a decade apart it will be possible to comment on emerging areas in attachment research and their researchers, as well as on differential contributions of different authors to the field by comparing the results from the analysis across editions.

Drawbacks of the method of data collection.
The way of collecting our basic data, i.e. using the reference lists in combination with the author index, is not entirely without problems. In particular a number of discrepancies between the two should be mentioned.

First. Citations to chapters in the same edition of a *Handbook* are not listed in the chapter reference lists. This resulted in lower citation counts from the reference lists compared to those based on the author index for those researcher(s) who were author of a chapter in the same edition.

Second. Citations to different articles or book chapters of the same author on the same page resulted in a higher count from the reference lists than from the author index as the author index only indicates that an author is mentioned on a particular page and not how often this was done. In theory these discrepancies can be resolved by manually scanning all 1863 pages in the *Handbooks* but given that these pages were not available in a digital format, it was considered a too onerous task given the expected rewards.

Third. Often the first time a reference is cited in a chapter all authors are mentioned but later citations in the same chapter are indicated by First Author *et al.* if there are three or more authors of the reference. This reduces the counts in the author index for all second and later authors. Apart from going through the entire text by hand, there is little one can do about this.

Fourth. A final point is the relationship between content and citations. One may divide papers roughly in theoretical investigations, original empirical research papers, narrative or qualitative reviews, meta-analyses or quantitative reviews and methodological papers presenting methods of collecting and/or, analysing data and validation studies of such methods. The expected citation rates of papers in the various categories are most likely not equal. It is expected that especially papers presenting important advances in methodology, and narrative and quantitative reviews will tend to attract relatively larger numbers of citations. Such citation tendencies will undoubtedly have had an influence on the results presented here, but what these influences are and how they colour the analyses presented here requires a separate study.

Analysis methods

The two basic questions (*Who published with whom?* and *Who published what?*) were tackled with multidimensional scaling and correspondence analysis respectively using the appropriate modules in SPSS 16 (see Meulman & Heiser, 2004). Both techniques aim to provide a graphical representation of the matrix or table to be analysed. The four matrices with the information on which this paper is based are listed as Appendix D digital versions can be requested from the first author.

Multidimensional Scaling (MDS)

MDS is a technique which operates on a similarity matrix or on a dissimilarity matrix (e.g. Borg & Groenen, 2005). Our co-author matrix is a similarity matrix in which a high number indicates that papers written jointly by the row and column authors were often referenced in the *Handbook* chapters. The main purpose of the technique is to find a low-dimensional spatial representation, mostly a two-dimensional graph, such that the co-authorship patterns embodied in the similarity matrix are represented as well as possible. In the graph the similarities are inversely represented by distances: the greater the similarities the smaller the distances between two authors. Groups of authors who publish nearly exclusively within their own research group will lie closely together in the space with few links to the outside world, but authors who do not publish together (generally) lie at larger distances from each other. Because in this paper we do not use the full-dimensional space but only the two most important dimensions, there is a certain amount of distortion in that some authors seem closer together than they really are, especially in the middle of the graph. To counteract this we have drawn connecting lines between some of the authors (for details see below).

Researchers were designated as spiders if they have published papers with six or more of the other selected authors. However, note that there is a category of authors who are influential but have primarily published on their own so that they cannot be represented in the Web because their co-author count is zero.

Correspondence Analysis (CA)

CA is a technique for (large) rectangular contingency tables with positive numbers, mostly frequencies (e.g. Greenacre, 1984, 2008). In large tables a test of independence between rows and columns is nearly always significant and thus not very informative. The interesting part of (large) contingency tables is the interaction between rows and columns and it is this interaction which is displayed in correspondence-analysis graphs. Our contingency table consists of authors (rows) and chapters (columns), so that the graphs help interpreting the interaction between authors and chapters. As chapters in the *Handbooks* almost exclusively deal with a single topic or attachment subdomain we may proceed with equating chapters with subject areas.

Contingency tables may be examined both row-wise (here, by authors) and column-wise (here, by chapters). In the latter case we refer to *chapter profiles*, which consist of the number of times (or proportion of times) that individuals have been an author of papers mentioned in the chapter references. Similarly an author profile consists of the number of times (or proportion of times) an author appears in the references of the chapters (see Figure 1, right-hand panel). When chapters have similar profiles largely the same authors are referred to in these chapters so that we may assume these chapters treat similar topics. If authors have similar profiles across chapters we will assume that they work in the same subdomains of attachment.

The results of a correspondence analysis can be portrayed in three maps or graphs which show either (1) the relationships between the authors via the author profiles, or (2) between the chapters showing the chapter profiles or (3) between authors and between chapters showing both type of profiles in a single graph. Here we will present the first two graphs explicitly and the third one only implicitly (see below).

In these correspondence graphs[2] the origin represents the model of independence or lack of interaction so that all authors and chapters would lie at the origin if there was no relationship between authors and chapters. The further away chapters and authors lie from the origin the greater their deviations from independence. Positive deviations indicate that authors are referenced more often than expected on the basis of independence between chapters and authors, and negative deviations indicate that authors are referenced less than expected. Chapters are generally represented as lines passing both through the origin and the chapter points. However, to avoid clutter in the graphs we will only show part of these lines in particular the part from the origin to the chapter point (see Figure 2). The part shown is the positive side of the line and refers to positive deviations from independence, while the part on the other side of the origin is the side of the negative deviations. When chapter lines point in the same direction and make small angles the chapter profiles are similar, when they are at right angles the chapter profiles are independent of each other. Authors profiles are shown as points (see Figure 2). The closer the points lie together the more similar their profiles are.

To evaluate the relationships between authors and chapters one should superimpose the author graph and the chapter graph. However, this makes the graph unreadable due to the large number of objects and labels. Therefore, we have decided to present these graphs on the same page below each other requesting the reader to mentally superimpose them. To assist in this we have drawn lines for the major research domains in the author graphs (see Figures 8 and 10). To evaluate which authors have a comparatively higher number of references in a particular chapter one should project each author on the line of that chapter. The order of the projections of the authors on the chapter lines indicates the relative size of the authors' numbers of references in a chapter bearing in mind the distortions due to the two-dimensional approximation. When an author point projects highly and positively on a chapter line the individual has a relatively large number of references in this chapter. When an author point projects highly on the negative part of the line (not shown in our graphs) very few or none of that author's publications are present in the reference list.

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[2] Technical note: The correspondence analysis graphs in this paper are shown in their symmetrical representations, which means that technically speaking the Euclidean distances between points are not exactly representing their chi-squared distances but only approximations to them. However it makes for more easy comparisons between column points and row points (for details see Greenacre, 2008, Chapters 6 and 13).

A tiny subset of the data portrayed in Figure 2 may serve as an example. The angle between the chapter on Pair bonds and the chapter on Romantic relationships is small so that authors who are more frequently referenced in the Pair Bonds chapter tend to be referenced more frequently in the Romantic relationships chapter as well. Hazan is an example of an author with relatively large number of references (6 and 7, respectively), while Belsky is an example of a relatively less referenced author in both these chapters (once in each chapter). The origin indicates the point of independence of authors and chapters. Author points projecting into the origin have a profile proportional to the marginal or average author profile. Similarly chapters located at the origin have profiles proportional to average or marginal chapter profile.
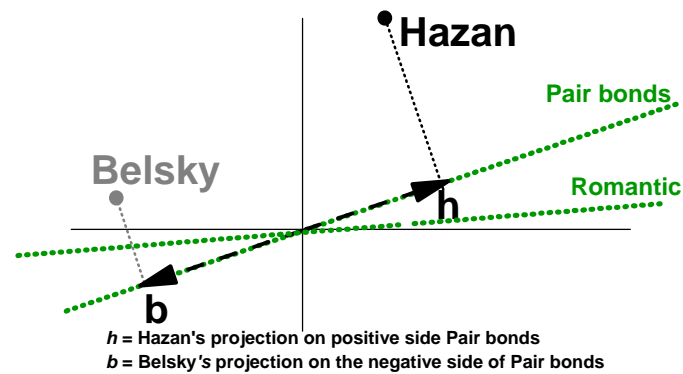
Figure 2. Interpretation of correspondence analysis biplot of chapters and authors.

One technical point about both analyses is that they are generally sensitive to row and/or column totals with very low or zero frequencies. In order to get appropriate outcomes, authors without co-authors cannot be included and authors with very low co-authors scores are not always optimally placed in the graph of the multidimensional scaling analyses due to the lack of information about their relationships with other authors. The prime example is Bowlby whose paper with Ainsworth (mentioned once in 1999 and twice in 2008) is the gossamer thread which connects him to the web of attachment determined by co-authorship (Figures 5 and 6). Without these three references he could not have been included in the graph. In the correspondence analysis, authors who did not feature in the chapter reference lists could not be included in the correspondence analysis solution. This only was the case for Roisman and Munholland in the first edition of the *Handbook*.

Results
In this section we will first examine the selection of authors on the basis of their numbers of pages in the Author indices of each of the two editions of the *Handbooks*, and compare the differences and similarities between the two. We will also compare the number of pages on which authors are cited with the number of times their publications are mentioned in the chapters' reference lists. To find the spiders in the web of attachment co-authorships for each edition will be examined separately. Next, using the graphs per edition of the chapter profiles and of the author profiles we will investigate both the chapter referencing patterns and the author profiles across chapters. The results of the two editions will be compared to evaluate the changes in the world of attachment in the decade between the two editions of the *Handbook of Attachment*.

Frequently cited authors and changes over time: Page counts and reference counts

Page counts.
Fifty-two authors appear on at least 30 pages of either *Handbook* and their total number of appearances in terms of numbers of pages (*page count*) is 2670 in the first edition and 3650 in the second edition which is an increase of 36%. The increase in the total page count in the 2008 edition

compared to the 1999 edition is primarily the result of the extension of the *Handbook* with three chapters or 86 pages in total. As was mentioned in the method section an author's page count is an underestimate of the times the author has been cited, because the number of times an author appears on the same page is not included, nor are second and later authors included more than once for publications with three or more authors in the same chapter.

Of the 52 authors the majority were native English speakers from Australia, Canada, the UK and the US; in addition there were one Israeli, two Dutch and two German authors. The dots in Figure 3 represent the 52 authors who were referenced in either *Handbook*. The axes show the percentages of numbers of pages on which these authors were referenced for each of the editions. The percentages were taken with respect to the total number of pages mentioned in the index for the selected authors i.e. 2670 in the first edition and 3650 in the second edition; thus 1% is 27 pages for the first edition and 37 pages for second edition, respectively.

Figure 3 shows that there is a great stability in the page counts with virtually all authors differing less than one percent between the two editions. Visually there seem to be three groups of authors: the *Founders* of attachment theory and research (Bowlby, Ainsworth, and Main), what may be called *Second-generation researchers* (Belsky, Cassidy, Shaver, Sroufe, Van IJzendoorn, and Waters; circled in Figure 3) and the other frequently cited authors. Comparing the two editions it can be observed that especially the percentages of Mikulincer, Fraley and Shaver have increased, while those of Waters, Belsky, Cassidy and Main have decreased somewhat. The back cover of this report shows the same information as a so-called *tag cloud* produced using the website www.wordle.net.
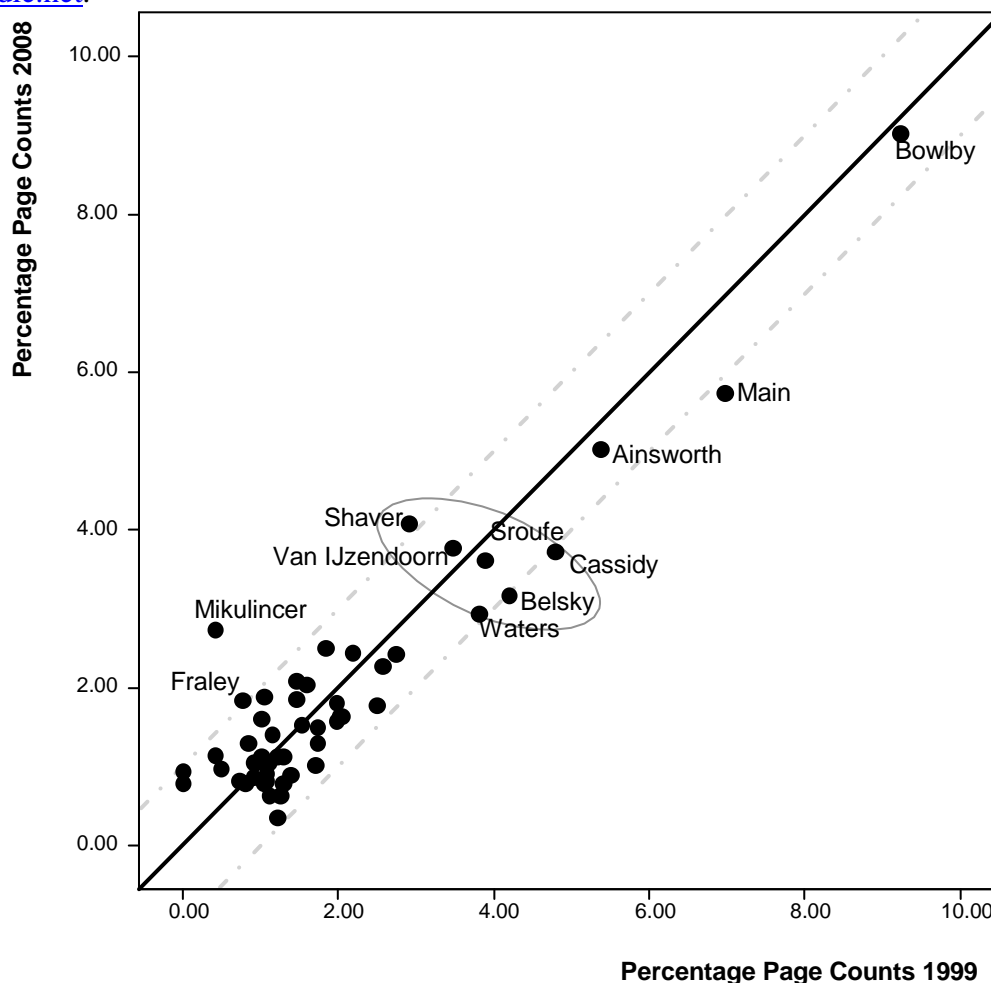
Figure 3. Page counts. Percentages of *Handbook* pages on which the selected authors are mentioned. The central solid line indicates equal percentages in both *Handbooks*; lines parallel indicate ± 1 percent. Authors above the central line have increased percentages in 2008, those below have decreased percentages.

Reference counts.
Figure 4 represents another way to evaluate the influence of authors' work. It shows for both editions the percentage of the times that authors occurred in the reference lists of the chapters - *reference counts*. Interestingly, all three Founders were referenced comparatively less in 2008 than in 1999 which might point to a widening of the field to areas where a direct reference to these Founders is less relevant.
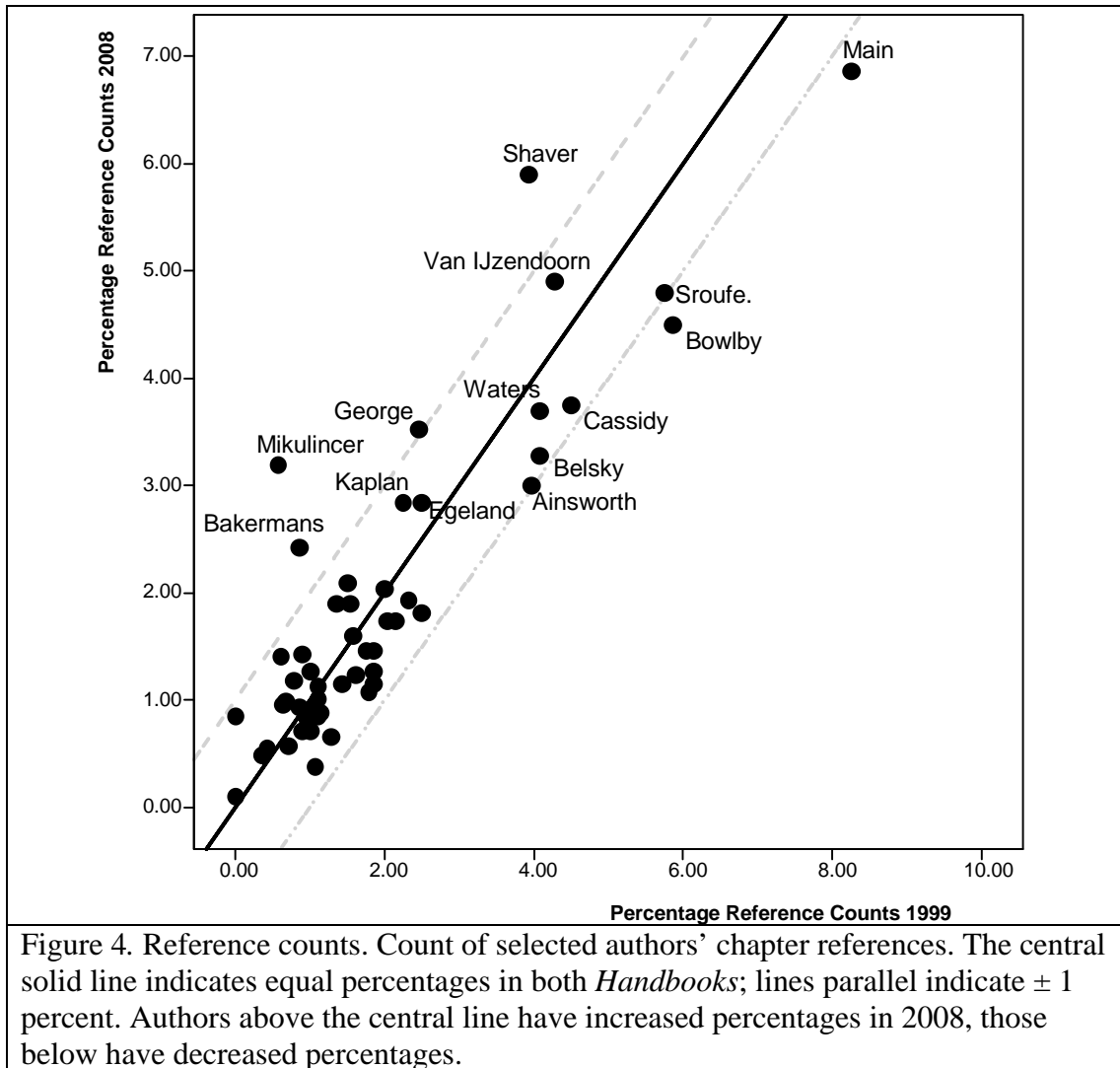

Figure 4. Reference counts. Count of selected authors' chapter references. The central solid line indicates equal percentages in both *Handbooks*; lines parallel indicate ± 1 percent. Authors above the central line have increased percentages in 2008, those below have decreased percentages.

Table 1. Correlations between page counts from the author indices (*Page counts*) and total number of references from end-of-chapter reference lists (*Reference counts*).

		Page counts		Reference counts	
		1999	2008	1999	2008
Page counts	1999	1.00			
	2008	**.93**	1.00		
Reference counts	1999	**.91**	.83	1.00	
	2008	.76	**.82**	**.89**	1.00

The correlations between the two sources of information about the influence of the selected authors (page counts and reference counts) are .91 for the first edition and .82 for the second

edition, indicating that the two measures express both similar but also different aspects of the citation process (see Table 1). The page counts are an estimate of the overall citation frequency and are sensitive to multiple references to the same paper, while reference counts are more influenced by the number of citations to different papers. Many references in a chapter to the same paper have no influence on the reference count. In terms of the multitrait-multimethod terminology (Campbell & Fiske, 1959) the method variances (.93 and .89, see Table 1) are somewhat higher than the convergent validities (.91 and .82), while the discriminant validities have more or less the lower values. This indicates that the measures used are somewhat more influenced by the method of counting rather than by the edition of the Handbook from which they are determined.

The web of attachment and its spiders: Who publishes with whom?

The co-authorship matrices of both *Handbooks* were subjected to a multidimensional scaling analysis using the SPSS program PROXSCAL (Commandeur, Heiser, 1993; Busing, Commandeur, & Heiser, 1997). The matrix itself is largely empty as most authors have only published with few of the other selected authors. The results of the multidimensional scaling are portrayed in Figures 5 and 6, for the 1999 and 2008 editions, respectively (Fit measures for both analyses: Normalised raw stress = .14; S-Stress = .33; Dispersion accounted for = 86.). The distances in the figures represent the similarities between authors, i.e. the extent to which they have co-authored papers with short distances representing higher similarities.

Figures 5 and 6 give a representation of the Web of Attachment based on co-authorship. It can be observed that this web has become more dense over time. The number of spiders increased from 8 to 11, the total number of co-authors increased from 156 (mean 3.0) to 192 (mean = 3.7), the number of connections between spiders increased from 9 to 17, the number of authors not connected to any spider decreased from 8 to 5, and the number of authors without co-authors decreased from 4 to 2.

In the figures we have underlined the Founders and marked the spiders (in solid blue dots). The fatter solid (blue) lines connect spiders. In addition, we have connected the spiders with all their co-authors. This shows that virtually all selected authors are connected with at least one spider. In other words, relatively few papers are written by isolated co-authors. This supports the idea that there really is a web of attachment researchers. In addition, it is evident that there is also a subweb of the spiders themselves. It should be noted that the links do not signify the numbers of citations so that some links are based on a single paper or book. For instance, three of Ainsworth's links to other authors in 2008 (Figure 6) are due to the book *Patterns of Attachment* (Ainsworth, Blehar, Wall & Waters, 1978).

All 1999 spiders except for Egeland are 'Second-Generation' authors. The numbers of co-authors for the 1999 spiders in 1999 and 2008, respectively were: Ainsworth – 7 and 6; Belsky – 9/10 (2008), Cassidy – 8/11; Egeland – 6/6; Main – 8/6; Shaver – 7/8; Sroufe – 8/9; Waters – 13/12. Newly arrived spiders in 2008 are Bretherton, K. E. Grossmann and Van IJzendoorn with 6, 7, and 7 different co-authors each in 2008; while all of them had 3 co-authors in 1999.

Partnerships with highest number of citations (Based on the 2nd Edition)

Figures 5 and 6 only indicate the links between authors but do not indicate how successful these co-operations were in attracting a high number of references in the chapter bibliographies. This is indicated in Table 2. Note that these values should not be interpreted as an indication of overall citation rate (or popularity) of a research couple in the literature as a whole. After all a single publication can achieve at most as many references as there are chapters. Thus the number of references for *Patterns of Attachment* (Ainsworth, Blehar, Waters and Wall, 1978) is at most 37 for the first edition (the book is referenced in 32 chapters) and 40 for the second edition (31 chapters), while the book itself received 7200 citations so far (Google Scholar, retrieved 27 September 2009). As another example, the influential paper by Sroufe and Waters (1977) on "Attachment as an organisational construct" attracted 800 citations (Google Scholar, retrieved 27 September 2009), but

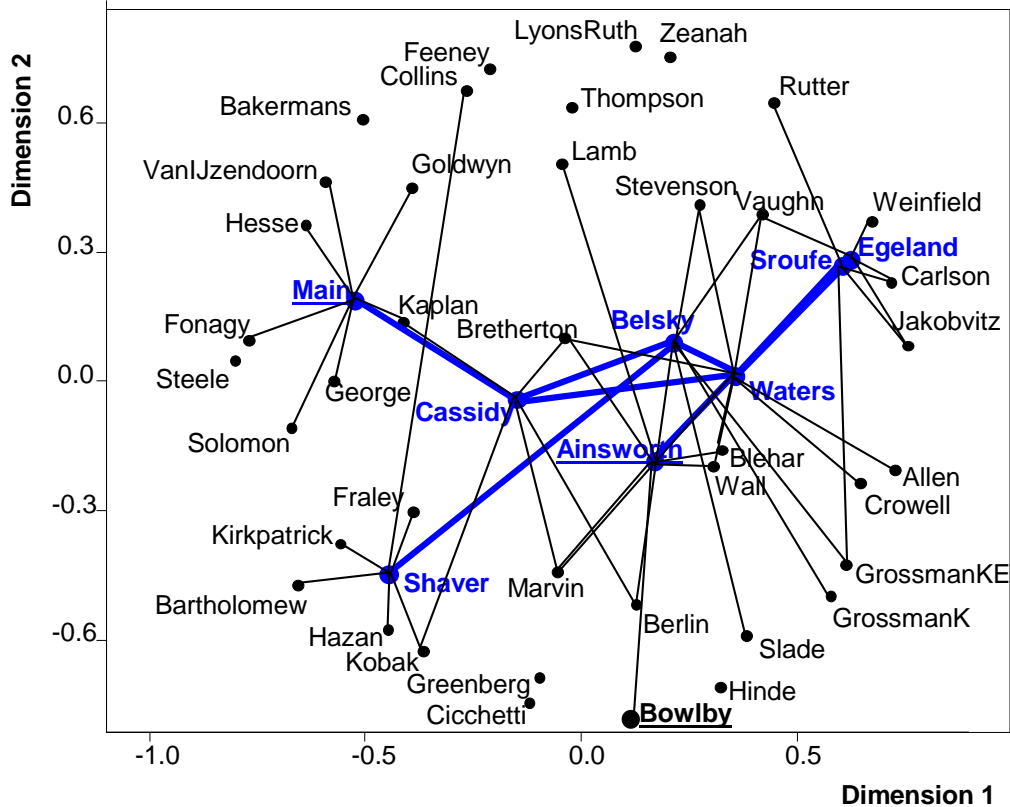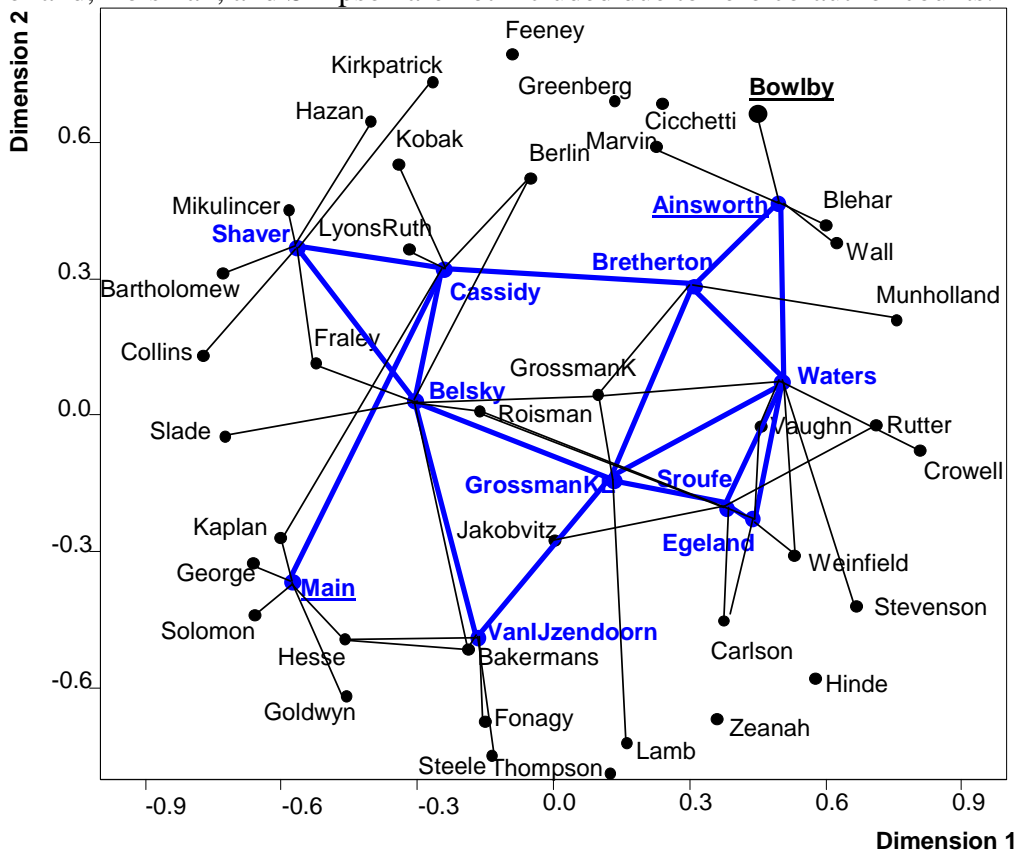they do not appear in Table 2, because their paper was only referenced in a limited number of chapters.

Figure. 5. Co-authorship 1999. Spiders: solid blue dots; Founders: underlined. Heavy lines connect spiders. Other lines connect spiders with their co-authors. Mikulincer, Munholland, Roisman, and Simpson are not included due to zero co-author counts.[3]

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[3] Due to space considerations Ms. Bakermans-Kranenburg and Ms. Stevenson-Hinde are indicated in the graphs as Bakermans and Stevenson, respectively.

Figure 6. Co-authorship 2008. Spiders: solid blue dots; Founders: underlined. Heavy lines connect spiders. Other lines connect spiders to their co-authors.
(Authors Allen and Simpson are not included due to zero co-author counts.)

Table 2. Number of references to pairs of co-authors

Co-authors	1st Edition	2nd Edition	Relative Increase
Main & Kaplan	**58**	**99**	+
Van IJzendoorn & Bakermans-Kranenburg	24	**87**	+++
Main & George	**34**	**70**	++
Sroufe & **Egeland**	**45**	**77**	+
Shaver & Mikulincer	0	**68**	+++
George & Kaplan	**29**	**67**	++
Main & Hesse	**28**	**51**	+
Grossmann, K.E. & Grossmann, K.	**32**	**45**	+
Egeland & Carlson	13	**44**	+++
Shaver & Hazan	**51**	**43**	-
Sroufe & Carlson	22	**42**	+
George & Solomon	**32**	**42**	
Main & Goldwyn	**29**	32	-
Ainsworth & (Blehar, **Waters**, & Wall)	**31**	31	-
Main & **Cassidy**	**37**	31	-
Fonagy & Steele	**42**	29	-

Note: Selection criterion: 1% of occurrences, i.e. 27 in 1999 and 37 in 2000. **Bold authors** are Spiders; **Bold numbers** meet the 1%-selection criterion; +++ = three-fold increase or more; ++ = two-fold increase; + = increase larger than increase on the basis of increased citations (= 1.36); (-) = decrease with respect to 1st Edition.

High values in Table 2 generally occur if authors have co-authored several papers which are referenced in many chapters, so that Table 2 mainly provides an impression of how successful author duos have been in attracting references to their joint papers across the *Handbooks*. It is thus a measure of the relevance of the co-authored works for the field as a whole. The last column indicates the changes in this measure for the second edition with respect to the first.

The most successful in terms of partnerships is clearly Main who appears in five combinations. Primarily four publications with Cassidy, George and Kaplan are responsible for the four appearances in the table: Main, Kaplan, & Cassidy (1985) which was cited over 2400 times (Google Scholar, retrieved 29 September 2009), and the three variants of George, Kaplan, & Main (1984, 1985, 1996), which were cited over 1400 times (Google Scholar, retrieved 29 September 2009). The major topics of these four papers were the theoretical considerations, detailing and development of the Adult Attachment Interview which has become an extremely powerful instrument in the field of adult attachment and in clinical studies and practice. *Patterns of Attachment* by Ainsworth, Blehar, Waters and Wall (1978) fulfilled a similar role for the Strange Situation Procedure. Powerful theoretically based and well-constructed research instruments are fundamental to any science and therefore attract many citations.

As indicated above Ainsworth's citations for her book *Patterns of Attachment* in Table 2 may not seem impressive at first site, but the feat of being referenced in practically every chapter of both *Handbooks* underlines the book's importance to the field. The steep rises of Shaver & Mikulincer en Van IJzendoorn & Bakermans-Kranenburg is due to their many joint publications in the decade between the two editions of the *Handbook*.
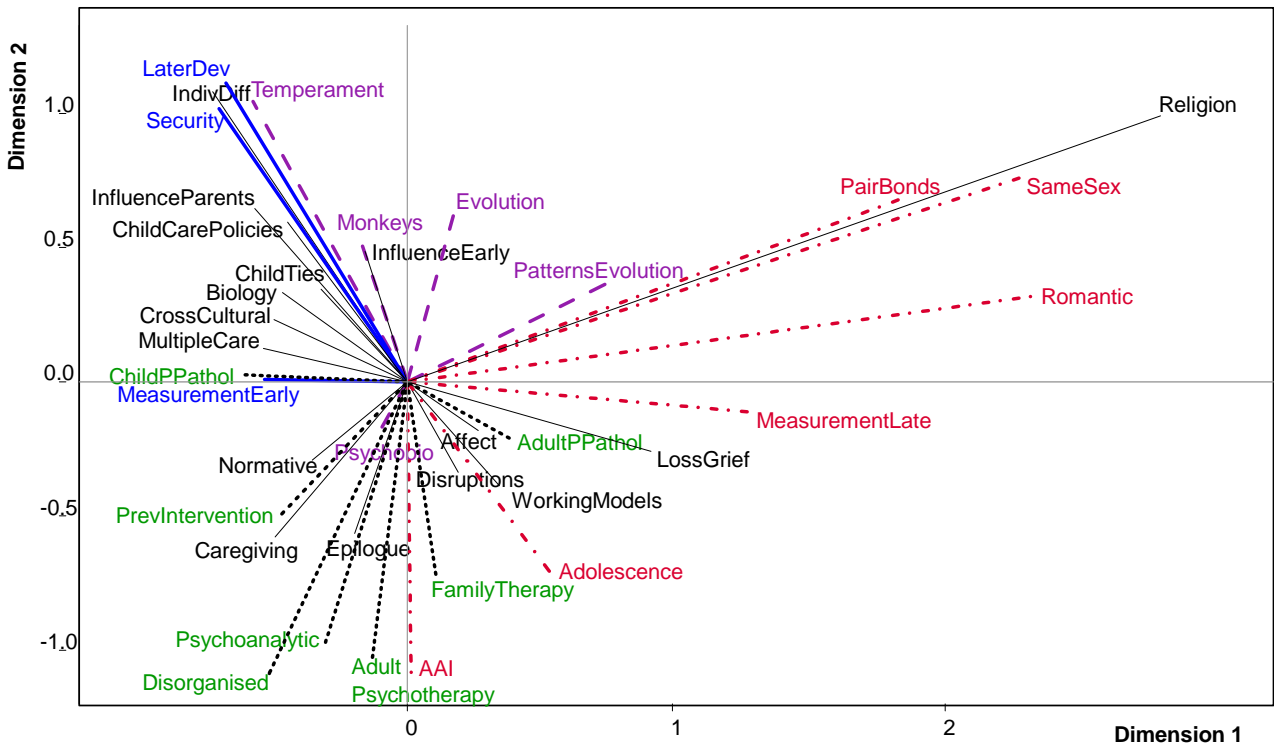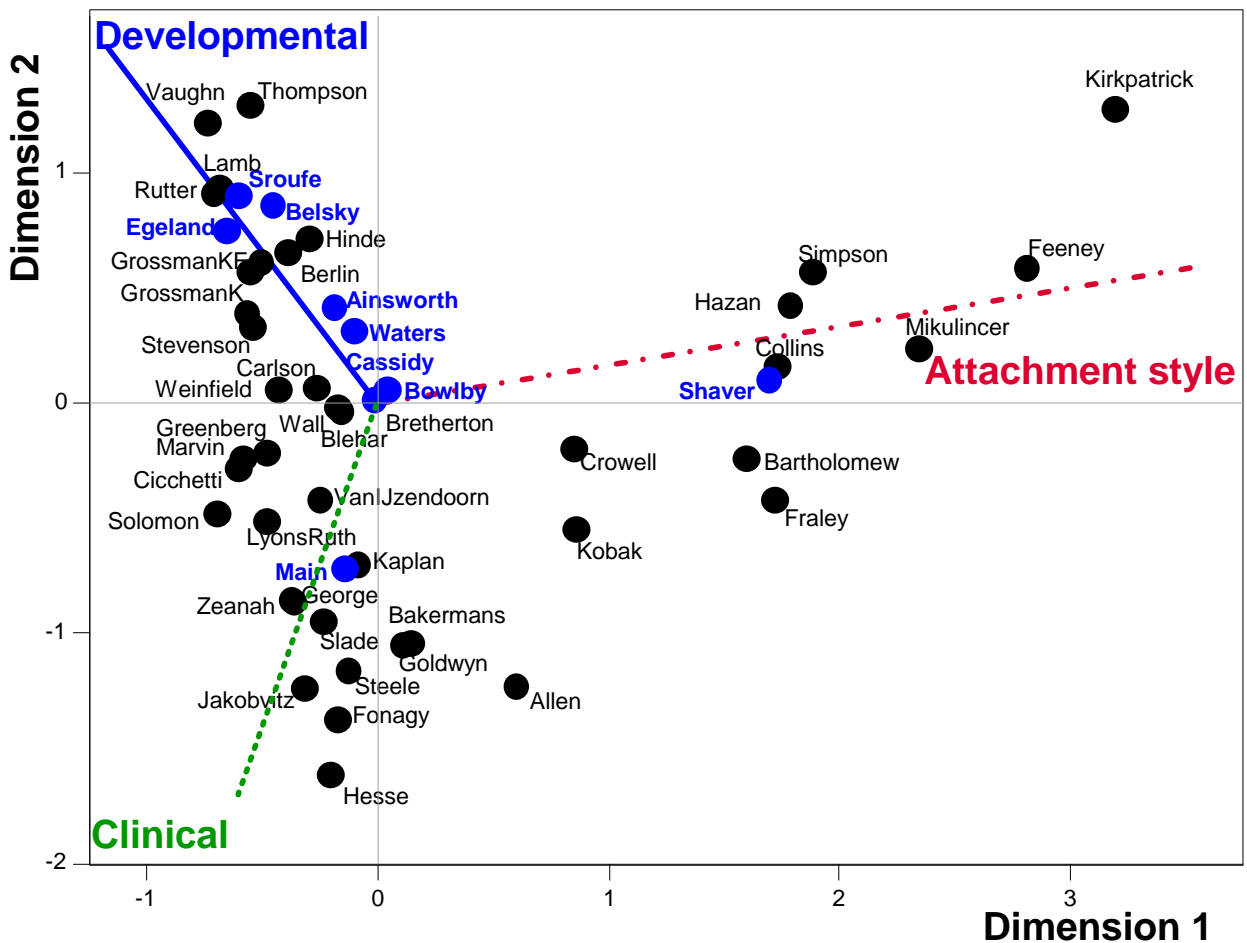
Figure 7. The 1999 chapter space based on the authors by chapters contingency table constructed from the references of the chapter of the 1999 edition of the *Handbook*. The axes from the correspondence analysis explain 20% and 11% of the variability (inertia), respectively. Red dash-dot lines = attachment style (adults); thick blue solid lines = developmental attachment; green dotted lines = clinical applications; purple dashed lines = biological aspects; thin black solid lines = other.
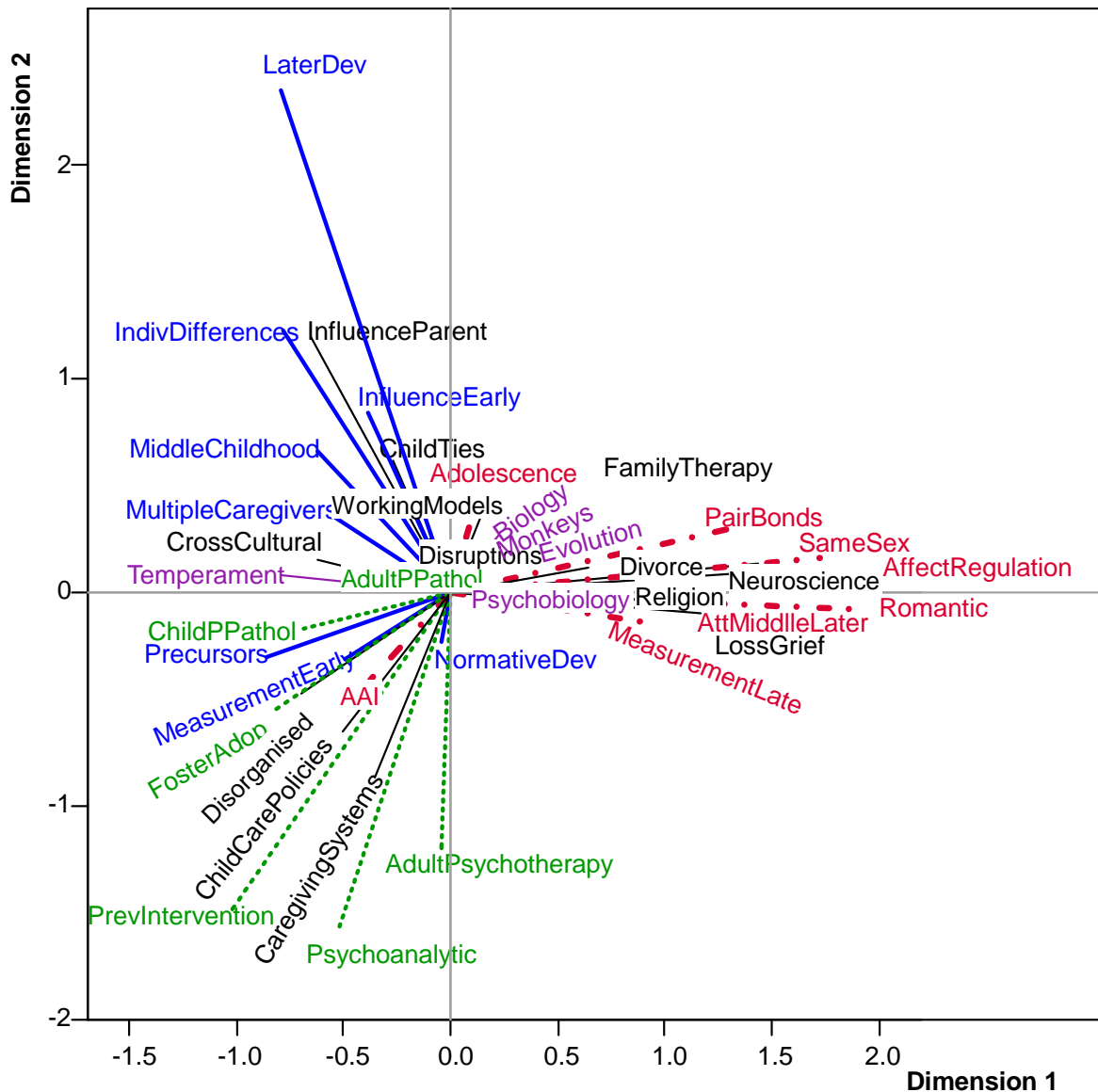

Figure 8. The 1999 author space based on the authors by chapters contingency table constructed from the

references of the chapter of the 1999 edition of the *Handbook*. The lines represent chapter groups (see text).

Who publishes what?

The basis for answering this question is the contingency table of authors (rows) and chapters (columns) in which the cells represent how many publications of a particular author are referenced in that chapter. To investigate the patterns we will look at both chapter profiles (Figures 7 and 9), at the author profiles (Figures 8 and 10) and at the figures together to assess which authors are especially referred to in which chapters of each edition.

1999 Chapter profiles.

In both *Handbooks* the chapters have been divided into a number of parts. The first part in the 1999 edition consists of introductions and overviews (Part I) and the last part of emerging topics (Part VI). The middle chapters are organised in substantive domains within attachment research, in particular Biological (Part II), Infancy and Childhood (Part III), Adolescence and Adulthood (Part IV), and Clinical Applications (Part V).
    The first two major areas of attachment research that emerge from Figure 7 reflect the distinction between (1) *developmental attachment research* (children) and (2) *attachment style research* (adults). On a theoretical level, research regarding attachment patterns in children is rooted in the traditions of developmental psychology, whereas research examining the development of adult attachment styles originates from a social psychology framework. The third major area of attachment research represents (3) *clinical applications* with a focus on attachment representations and internal working models of attachment that are generally targeted in therapies and interventions.
    What can also be derived from the graph is where one should position the chapters of the first and the last Parts of the *Handbook*. For instance Weinfeld, Sroufe, Egeland and Carlson's chapter (Chapter 4; label in the graph: IndivDiff) on the nature of individual differences in infant-caregiver attachment is firmly located in the developmental area, while Kirkpatrick's chapter (Chapter 35; Religion) on attachment and religious representations and behaviour is a clear representative of the attachment-style domain. On the other hand the figure also shows that based on their references some chapters do not necessarily fall within their allotted Part. For instance temperament research (Chapter 10; Temperament) which is positioned in the 1999 *Handbook* in the Biological perspectives part can be found within the developmental attachment domain. Similarly, Chapter 19 (AAI) dealing with the Adult Attachment Interview and positioned as belonging to the part on attachment in adolescence and adulthood can be found in Figure 6 within the attachment representation and clinical applications domain.
    The Bretherton and Munholland's chapter (Chapter 5; WorkingModels; the second most cited chapter of the first edition of the *Handbook*, see Appendix B) on internal working models has references in common with both the attachment style research with adults and clinical applications. The reason for this is that individual differences in adult attachment and pair-bond attachment are both defined in terms of internal representations which are discussed in all chapters dealing with adult attachment. Furthermore, the attachment origins of maladaptation (i.e. clinical cases) are generally described in terms of the underlying internal working models about the self and about others. Internal working models are often seen as the main target for intervention efforts. Finally, from a psychoanalytic viewpoint, internal working models are of interest for the therapeutic process as these models influence how patients respond to therapy.
    The chapters grouped under the heading Biological Perspectives are not located in a specific well-defined area in the graph, which suggest that the research on biological perspectives does not have a clearly defined group of references in 1999, or at least not to our selected authors. Only the citation profiles of the evolutionary perspective chapters are fairly similar to each other. Simpson's contribution on attachment within an evolutionary framework (Chapter 6; Evolution) has more in common with developmental attachment research, primarily because his strong interest in the kind

of individual differences that also concern the developmental attachment researchers. On the other hand, Belsky's chapter on the evolution and patterns of attachment (Chapter 7; PatternsEvolution) has more references in common with attachment style research on adults, because he extensively discusses attachment patterns in relation to mating strategies. Mating is clearly an issue that relates to adult pair bonds. Based on their references Chapter 8 (Polan & Hofer; PsychoBio) and Chapter 9 (Suomi; Monkeys) were written from a perspective outside the standard attachment domains as they only mention 12 and 10 papers by our core authors. This shows that they contribute new perspectives which at the time were not really embedded in the standard literature on attachment. Their placings in the graph is therefore not a very firm one. Especially Suomi's chapter has found its way into the literature as it has been cited 165 times according to Google Scholar (retrieved 27 September 2009; see Appendix B).

A final point is that measurement in attachment research is not a topic in itself. The two chapters on measurement, Chapters 19 (Adult Attachment Interview; AAI), and 20 (Individual differences in adult attachment; MeasureLate) are not located close together but they are positioned within their substantive subdomains.

1999 Authors' citation profiles and their working areas.
The author profiles can best be discussed in direct relation to the subdomains for which they are mainly cited. In Figure 8 we have drawn lines for the three major attachment domains rather than lines for all chapters. The reader should mentally add the line for a relevant chapter when reading the ensuing discussion. The figure shows the similarity of the authors' profiles over the chapters. Thus authors who have a similar profile across chapters are located close together in the plot. For instance, we observe that Feeney, Simpson, Mikulincer, Hazan, Collins, and Shaver all deal with issues from attachment style research on adults as they all have long positive projections on the lines of chapters concerned with this topic (see also the explanation in Figure 2). Authors who are cited in (nearly) all chapters are located near the origin. Thus, not surprisingly, Bowlby takes up a central position in this graph as his work is fundamental to all attachment domains. Furthermore, authors like Bretherton, Greenberg, Cassidy and Van IJzendoorn have written papers relevant to various domains of attachment research which is confirmed by their central location in the graph. Wall and Blehar are at the centre as well because their citations are originating nearly exclusively from their co-authorship of the book *Patterns of Attachment* (1978) which is centrally located in the graph and as such illustrates the book's central position in attachment research. The two spider authors of this book (Ainsworth and Waters) are located less centrally because their other work is primarily cited in chapters dealing with developmental attachment research, so that their profiles are closer to the developmental chapters.

Of the Founders, Main is rather more off centre indicating that she is more often cited in specific chapters than the other two Founders, particularly in those chapters dealing with clinical applications as clinical research typically makes use of the Adult Attachment Interview (AAI). The spiders Sroufe and Belsky are cited especially for their work in the developmental attachment research while Shaver's citations are concentrated on issues related to adult attachment style.

The position of Cassidy is illustrative of the way Figure 8 is constructed. In Figure 5 we see that she takes up the central position, because she has co-authored papers with five other spiders, i.e. Shaver, Main, Belsky, Sroufe and Waters. Figure 8 shows that these authors together span the entire spectrum of attachment research. Therefore a reasonable position for Cassidy is somewhere close to the centre. However, the exact location will depend on the chapters in which she is most heavily referenced. Inspection shows her work to be referenced in 29 of the 37 chapters, but the highest frequencies occur in the developmental and clinical chapters rather than in the attachment style chapters, so that she is further away from the latter and in between the former two.
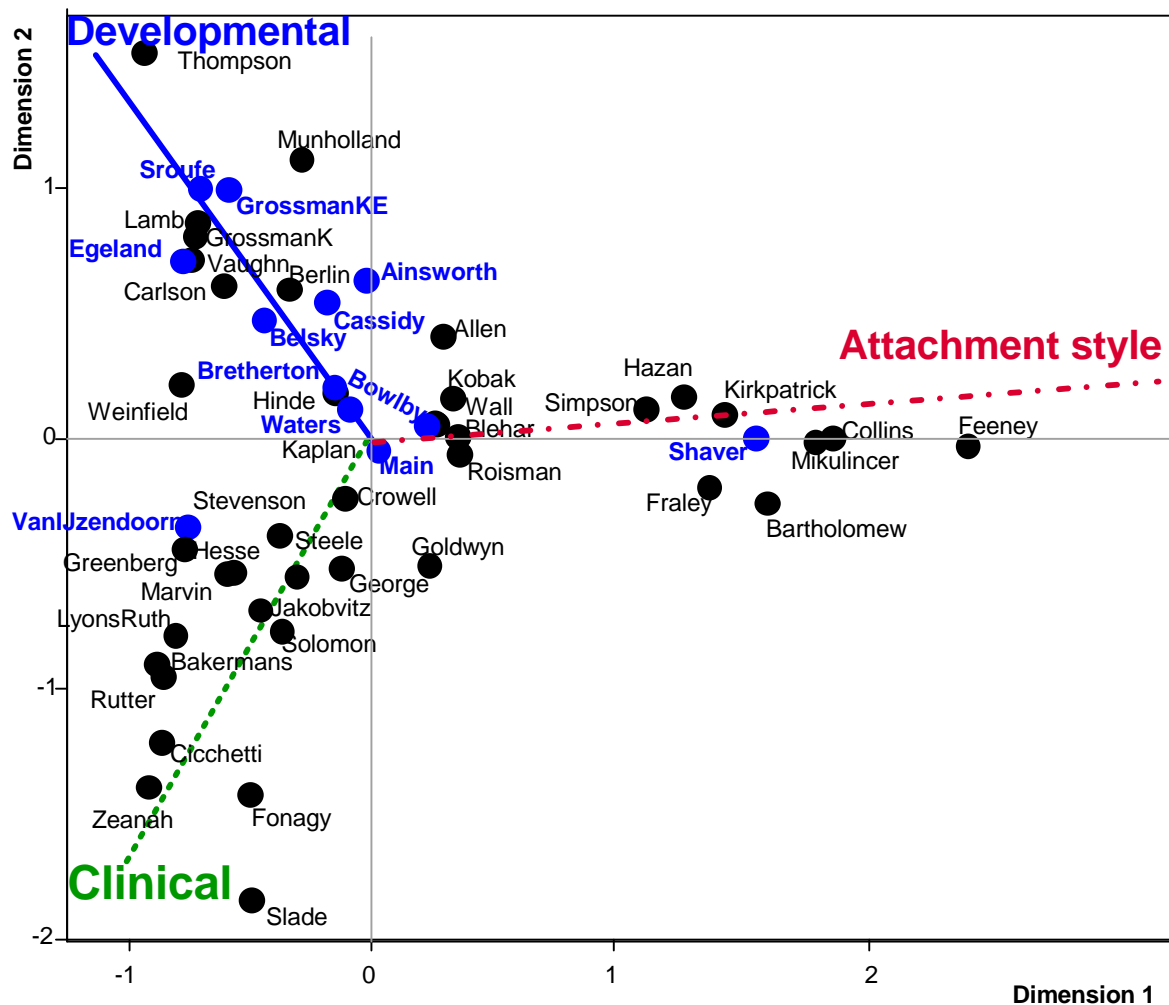
Figure 9. The 2008 chapter space based on the authors by chapters contingency table constructed from the references of the chapter of the 2008 edition of the *Handbook*.. The axes from the correspondence analysis explain 20% and 10% of the variability (inertia), respectively. Red dash-dot lines = attachment style (adults); thick blue solid lines = developmental attachment; green dotted lines = clinical applications; purple dashed lines = biological aspects; thin black solid lines = other.

2008 Chapter profiles.

In the 2008 *Handbook* the chapters have again been divided into six parts. The first part consists of overviews of attachment theory (Part I). The middle chapters are organised in substantive domains within attachment research, in particular Biological Perspectives (Part II), Infancy and Childhood (Part III), Adolescence and Adulthood (Part IV), and Clinical Applications (Part V). The last part contains chapters on special topics dealing with Systems, Culture and Context (Part IV).

Rather than describing the 2008 chapter space completely, we will primarily discuss differences with the 1999 chapter space. Clearly the reference patterns as a whole are extremely similar, so that we may conclude that in the last decade the world of attachment has not dramatically shifted. Again the space is dominated by the three domains: (1) developmental attachment research, (2) attachment style research with adults and (3) attachment representations or clinical applications

Figure 10. The 2008 author space based on the authors by chapters contingency table constructed from the references of the chapter of the 2008 edition of the *Handbook*.

Changes in chapter profiles

Notwithstanding the overall consistency over the years, a limited number of changes have occurred in the chapter space. Especially notable is the shift of the chapter on Adult psychopathology which was located with the attachment style research with adults but has moved completely to the centre of the graph. This is remarkable because the adult psychopathology chapter was written by the same authors in both editions. When one compares the references of the 1999 and 2008 chapters, there is a marked increase in references to authors in the developmental and clinical area which is the cause for the observed shift.

The new chapter on the neuroscience of attachment (Chapter 11) predominantly refers to the adult attachment style literature which explains its location in the graph. This suggests that there might be an argument for a similar chapter on the subject in relation to children.

There seems to be a tendency for the biological subjects to group together more in 2008 than in 1999,even though not all chapters grouped under the heading Biological perspectives in the second edition of the *Handbook* belong to this category according to their reference bases. Moreover, again the chapters on psychobiology and monkeys have very few references to papers of our core researchers, only 9 and 16 references, respectively. Therefore, the authors of these chapters have not integrated more literature from the attachment domains than a decade ago. In addition, their work has not been integrated in the other chapters to such an extent that the authors appeared on 30 pages or more in the second edition of the *Handbook.*

In both *Handbooks* the chapters on Caregiving systems (Chapter 35; Caregiving Systems) and Child care policies (Chapter 40; ChildCarePolicies) have more in common in terms of references

with the clinical chapters than the developmental attachment chapters, which suggests that issues related to child care have especially interested authors within the clinical field. The chapter on Caregiving systems includes a section on disabled care giving systems and disorganized attachment. These are themes that are closely related to the clinical application of attachment research, as they represent the malfunctioning attachment system. The chapter on child care policies discusses special populations such as children in foster or residential care, children with attachment disorders, and mothers with postnatal depression. These are all populations that are of special interest to clinicians as they represent at-risk groups most likely to benefit from prevention and intervention efforts.

Changes in author profiles

Not surprisingly the graphs of the author profiles for the two editions are as similar as are the chapter graphs. Looking at the Founders and the spiders it is clear that a number of them publish primarily in the developmental field (Ainsworth, Belsky, Cassidy, Egeland, K.E. Grossman, Sroufe, Waters) and form a close-knit group who publish together and cite each other frequently. However, it should be noted that Cassidy notwithstanding her co-authorship of the first edition with Shaver has not moved closer to the attachment-style side. If anything her work in the developmental field is now more often referenced than her other work on the Adult Attachment Interview. Shaver remains the only spider in the field of adult attachment style research. It is interesting to note that whereas Main through her work on the Adult Attachment Interview was a spider located well into the clinical application or attachment representation area in 1999, her work now seems somewhat less central to this area.

Conclusion

On the basis of the two editions of the *Handbook of Attachment* (Cassidy & Shaver, 1999, 2008) this paper has provided an overview of the relationships between the various domains in attachment research, has attempted to answer questions about the coherence of the group of attachment researchers, and has singled out those authors who are central to the field. An exercise such this is of course only as good as the data used. In the method section, it was already pointed out that there are some inherent inaccuracies due to way the data base had to be constituted. Moreover, several somewhat arbitrary decisions had to be made about key issues, such as who is considered a core author and who can be designated as a spider. Notwithstanding, the results present an insightful view of the world of attachment. The results point to interesting patterns about how this world is constituted and who does what with whom in this world. The dynamics of the relationships among authors could be examined via the two 'webs of attachments' on the basis of the co-authorships.

In terms of research areas as examined via references at the end of the individual chapters three coherent areas may be distinguished: (1) developmental attachment research with infants and children; (2) attachment styles research with adults and (3) clinical applications focusing on attachment representations and including intervention research. It is interesting to note that developmental attachment research and attachment style research remain distinct areas. It appears that the different theoretical origins of these two lines of research (developmental psychology and social psychology) still separate them. Thus, even though the *Handbooks* present both developmental attachment research and attachment style research as integral parts of the attachment framework, the two lines of research are still clearly separated by their distinct reference bases.

Among the more frequently cited authors one could distinguish three groups: the Founders (Bowlby, Ainsworth and Main), the Second-Generation authors (Belsky, Cassidy, Shaver, Sroufe, Van IJzendoorn and Waters) and a group of about 40 frequently cited authors. The second generation authors also function (together with Bretherton, Egeland, and K.E. Grossman) as spiders in the web of attachment by having at least six co-authors among our core set of authors. Nearly all

of the authors were connected with at least one of the spiders, even more so in 2008 than in 1999, signalling the increasing cohesion among the attachment researchers.

In the decade between the two editions, the spiders have generally consolidated their positions, be it that there is a weak tendency for some of the original publications by the Founders to become less referenced. Three authors have considerably increased their impact in that decade, i.e. Mikulincer, Fraley and Shaver, all three of them working in the field of adult attachment style.

It will be interesting to see whether by the time the third edition of the *Handbook* appears the changes compared to the earlier editions will show a larger change than between the first and the second one. The most likely candidate for a better defined research area seems to be the (neuro)biological side of attachment research. Even though there is a strong increase in research in the neurobiological aspects of attachment, no distinct group of papers of frequently cited authors have emerged so far which form a clear reference base for this area but this might just be a matter of time.

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Selected Authors and Page Counts in both Editions of the Handbooks

Author	Nr. of pages 1999	Nr. of pages 2008	Author	Nr. of pages 1999	Nr. of pages 2008
Ainsworth, M.D.S	155	197	Jakobvitz, D.	12	45
Allen, J.P.	23	31	Kaplan, N.	44	60
Bakermans-Kranenburg, M.J.	29	63	Kirkpatrick, L.A.	37	44
			Kobak, R.R.	58	64
Bartholomew, K.	31	36	Lamb, M.E.	40	35
Belsky, J.	121	124	Lyons-Ruth, K.	46	80
Berlin, L.J.	26	41	Main, M.	201	225
Blehar, M.C.	32	25	Marvin, R.S.	57	71
Bowlby, J.	266	354	Mikulincer, M.	12	107
Bretherton, I.	74	89	Munholland, K.A.	0	31
Carlson, E.A.	42	73	Roisman, G.I.	0	37
Cassidy, J.	138	146	Rutter, M.	32	41
Cicchetti, D.	37	31	Shaver, P.R.	84	160
Collins, N.L.	26	34	Simpson, J.A.	30	74
Crowell, J.A.	33	55	Slade, A.	21	32
Egeland, B.	42	82	Solomon, J.	79	95
Feeney, J.A.	24	51	Sroufe, L.A.	112	142
Fonagy, P.	59	64	Steele, H.	31	32
Fraley, R.C.	22	72	Thompson, R.A.	29	44
George, C.	63	96	Stevenson-Hinde, J.	35	14
Goldwyn, R.	49	40	Van IJzendoorn, M.H.	100	148
Greenberg, M.T.	50	51			
Grossman, K.	50	59	Vaughn, B.E.	35	44
Grossman, K.E.	57	62	Wall, S.	30	31
Hazan, C.	72	70	Waters, E.	110	115
Hesse, E.	53	98	Weinfield, N.S.	14	38
Hinde, R.A.	36	25	Zeanah, C.H.	27	41

Note: The column number refers to the number of citations to the chapters according to Google Scholar (for details see p. 15)

Wordle tag clouds for the *Handbooks of Attachment*

1st Edition

2nd Edition

Wordle renderings of the number of times authors are mentioned in the author index (Constructed with Wordle, http://www.wordle.net/). The size of the letters is determined by the number of pages. The orientations and placings of the name are arbitrary.