

On the validity of citation counting in science evaluation: Content analyses of references and citations in psychological publications

GÜNTER KRAMPEN, RALF BECKER, UTE WAHNER, LEO MONTADA

*Department of Psychology and Institute for Psychology Information (ZPID),
University of Trier, Trier (Germany)*

In reference to the increasing significance of citation counting in evaluations of scientists and science institutes as well as in science historiography, it is analyzed empirically what is cited in which frequency and what types of citations in scientific texts are used. Content analyses refer to numbers of references, self-references, publication language of references cited, publication types of references cited, and type of citation within the texts. Validity of citation counting is empirically analyzed with reference to random samples of English and German journal articles as well as German textbooks, encyclopedias, and test-manuals from psychology. Results show that 25% of all citations are perfunctory, more than 50% of references are journal articles and up to 40% are books and book-chapters, 10% are self-references. Differences between publications from various psychological sub-disciplines, publication languages, and types of publication are weak. Thus, validity of evaluative citation counting is limited because at least one quarter refers to perfunctory citations exhibiting a very low information utility level and by the fact that existing citation-databases refer to journal articles only.

Introduction

Since the beginning of science in the Greek antique, citation of other scientists is the *via regia* of indirect and lasting communication in sciences (see, e.g., ARISTOTLE, undated/1959). Reception and reflection of the older as well as recent scientific

Received April 29, 2006

Address for correspondence:

GÜNTER KRAMPEN

University of Trier, Department of Psychology and ZPID, D-54286 Trier, Germany

E-mail: krampen@uni-trier.de

0138–9130/US \$ 20.00

Copyright © 2007 Akadémiai Kiadó, Budapest

All rights reserved

literature and its citation in ones own publications meet the professional and ethical requirements of scientific work. This information utility of cites is in the focus of the normative theory of citing (for an overview, see, e.g., CRONIN, 1984). Positive receptions and citations of the work of other authors, their hypotheses, methodologies, data, empirical results, insights, ideas and suggestions are at the same time indicators of their impact on scientific progress. Therefore, in science historiography bibliometrical analyses of references and citations are used to portray the development in fields of research (see, e.g., BAGBY et al., 1990; PERLMAN, 1984) as well as the impact of single, prominent scientists (see, e.g., BROŽEK, 1980; MCPHERSON et al., 1984). Citation-databases, such as Social Science Citation Index (SSCI) and Science Citation Index (SCI) made quantitative bibliometrical analyses much easier – at least from a superficial point of view.

Today additional applications of these citation-databases have become the focus of attention not only within the scientific communities, but also in public and in science policy. Citation counting is increasingly used in comparative evaluations of scientists, science institutes, universities and nations as well as of their impact on scientific progress and the impact on scientific journals in (nearly) all sciences (ENDLER et al., 1978; GARFIELD, 1979; GRAY, 1983; MAY, 1997). There are a lot of methodological and technical problems in automatic citation counting due to the selectivity of journals documented, overestimations because of namesakes, spelling mistakes in databases etc. (see COLE & COLE, 1971; SCHUI & KRAMPEN, 2006). Among them are two which refer to (1) the validity (or quality) of citations as evaluation indicators of impact and (2) the representativeness of journal articles for scientific publications citing other authors. Content analytical results of citations in Physics-, Sociology- and Demography-Journals showed that perfunctory citations without any further reference to the content of the source cited, are very frequent (up to 40%). It also shows that critical, negative citations make up 5–14% of all citations in the texts (CHUBIN & MAOITRA, 1975; MORAVCSIK & MURUGESAN, 1975; PERITZ, 1983; for overviews, see CRONIN, 1984; LIU, 1993), thus putting the validity of citation counting and its limitation to journal articles in the existing citation-databases in question. Social constructive views of citing refer to these citations “questioning the assumption that citations have *prima facie* equal value” (CRONIN, 1984, p. 26).

To test validity and representativeness of citations as evaluation criteria in sciences, exemplarily for psychology, references and citations made in random samples of English versus German journal articles as well as German text books, encyclopaedias, and test-manuals were content analyzed. The study focused upon questions concerning (1) the representativeness of journal articles for citation counting (in comparison to lasting and wide-spreading references in textbooks, encyclopaedias and test-manuals) and (2) the relative frequencies of high-quality positive citations (with direct reference to results, theories or methods in the source cited, word-to-word citations, adoption of

methods, tables, figures or listings), critical or negative citations (theoretical or methodological criticism of the reference cited) and perfunctory citations without any further reference to the contents of the source cited.

Method

The text material used in the content analyses refers to stratified random text samples from journal-, textbook-, encyclopaedia- as well as manual-publications published in social psychology, personality psychology and developmental psychology. Analyses of books and encyclopaedias include publications in the scientific fields of biological psychology, educational psychology and clinical psychology as well as publications of test-manuals in educational psychology and clinical psychology too. Books, manuals, and journals were drawn from the populations of high impact Anglo-American and German psychological journals as well as German textbooks, encyclopaedias and test manuals with high editions and circulation. The text material studied consisted of:

1. 45 journal articles published in Anglo-American psychological journals in 1985, 1990 and 1995 (*Journal of Personality and Social Psychology*: Both sections; *Developmental Psychology*);
2. 45 journal articles published in German psychological journals in 1985, 1990 and 1995 (*Zeitschrift für Sozialpsychologie*, *Zeitschrift für Differentielle und Diagnostische Psychologie*; *Zeitschrift für Entwicklungspsychologie und Pädagogische Psychologie*);
3. 6 German authored textbooks (AMELANG & BARTUSSEK, 2001; BIRBAUMER & SCHMIDT, 2003; DAVISON et al., 2002; HERKNER, 2001; TAUSCH & TAUSCH, 1998; TRAUTNER, 1992);
4. 6 German edited textbooks (BAUMANN & PERREZ, 1998; EHLERT, 2003; FREY & IRLE, 1998/2002; HERRMANN & LANTERMANN, 1985; KRAPP & WEIDENMANN, 2001; OERTER & MONTADA, 2002);
5. 6 German encyclopaedias (GRAUMANN, 1972/1975; BIRBAUMER et al., 1994–1997, 1996–2000, 1996–2001, 1996–2002; THOMAE, 1959);
6. 10 German test-manuals (BORKENAU & OSTENDORF, 1993; FAHRENBERG et al., 2001; FRANKE, 2002; GRIMM & SCHÖLER, 1991; KASTNER-KOLLER & DEIMANN, 1998; KROHNE & PULSACK, 1995; MÜLLER, 1980; ROSENZWEIG et al., 1957; TEWES et al., 2000; WITTCHEN et al., 1997).

The first step of the content analyses focused on the *reference lists*. Numbers of references in total and of self-references, references to contributions in the same journal or edited book as well as references to English, German and other-language sources were counted. Additionally, publication types of the references cited were identified

(e.g., journal-article, authored book etc.; see Table 1). Agreement of two independent coders was 100% for all publication types under study.

The second step of content analyses focused on the type (or quality and function) of all single citations made in the texts under study. With reference to the very heterogeneous existing citation classification approaches (for an overview, see e.g., CRONIN, 1984) an exhaustive category system with validity for psychological publications was developed inductively and empirically tested in pilot-analyses. This exhaustive category system includes the following *types of citation*:

- (01) direct reference to a theory or a theoretical conception (construct) of the literature cited in the text;
- (02) direct reference to a method of the literature cited in the text;
- (03) direct reference to an empirical result of the literature cited in the text;
- (04) adoption of an assessment method (e.g., test, questionnaire) from the literature cited;
- (05) adoption of a statistical data analyses method from the literature cited;
- (06) adoption of a table, figure or listing from the literature cited;
- (07) word-to-word citation;
- (08) theoretical criticism of the literature cited;
- (09) methodical or methodological criticism of the literature cited;
- (10) overview-citation: following the pattern for an overview, see, e.g., ..., in summary, see, e.g., ... without any further reference to the content of the literature cited;
- (11) perfunctory citation: following the pattern see, e.g., ..., see in addition ..., see also ... without any further reference to the content of the literature cited;
- (12) rest: remaining (unclear) citations.

Here, the compliance of two independent coders was 96% ($Kappa = 0.95$; $p < 0.01$) for journal articles, 95% ($Kappa = 0.89$; $p < 0.01$) for textbooks and encyclopaedias, and 98% ($Kappa = 0.91$; $p < 0.01$) for test-manuals under study.

Results

How much references and what kind of references are cited?

The results concerning the number of references cited and their publication types are summarized in Table 1 for all types of publication under study. *Reference lists* of textbooks and encyclopaedias are much more extensive than these of journal articles and test-manuals. Significant main effects in analyses of variance show some differences between publications from psychological sub-disciplines (significantly more references in journal articles from personality psychology than social and

developmental psychology), publication years of journal articles (significant increase in reference lists between 1985 and 1995) and encyclopaedias versus textbooks (significantly more references in encyclopaedias).

More interesting is the *quota of self-references* varying from 7% in books (no matter what type) over 11% in journal articles to 18% in test-manuals without any significant differences between publication language (for journal articles only), sub-disciplines and publication years (see Table 1). This adds up to a self-reference quota in psychological publications of roundabout 10%.

Cited references, which were published in the *same publication-media*, exist only in journal articles (see Table 1). On average 10% of all references cited in journal articles refer to articles published earlier in the same journal. Such media-internal citations are significantly more frequent in personality psychology (13%) in contrast to 5% in development psychology and social psychology (10%). Furthermore, this practice is used more in Anglo-American journals (17%) in contrast to 3% in German journals. At the same time, an increase of this practice could be identified over the examined publication years (1985: 6%; 1990: 12%; 1995: 11%). It seems that especially Anglo-American journals on personality psychology use this practice today in order to enhance their own impact-factor.

In all texts under study, *English references* are most frequently cited. This is rather trivial for English journal articles (the 100% of English references cited in Anglo-American journal articles are somewhat astonishing, however); not so for German psychological publications. English references are clearly dominant in all types of German publications. Their relative frequency varies from 62% in test-manuals over 66% in textbooks and encyclopaedias to 71% in German journal articles (increasing significantly from 1985 to 1995; see Table 1). References in languages other than English- and German-language are rarely given, i.e., 26 French and another six French references in two of the (older) German encyclopaedias and one Danish reference in a German test-manual.

Most frequent *publication types of references cited* are journal articles in test-manuals, textbooks, encyclopaedias and journal articles themselves (see Table 1). Only for journal articles results point at (1) a significantly more frequent citation (significantly higher citation-frequency) of other journal articles in personality psychology (56% in contrast to 44% in developmental psychology and 42% in social psychology) and (2) a significant continuous increase in citing other journal articles over time (1985: 36%; 1990: 49%; 1995: 64%). However, references to journal articles in all types of psychological publications have a quota of approximately 50% to a maximum of 65%. The remaining references given belong mainly to the publication types of authored books (13–23%) and book-chapters (9–20%) with a significantly higher quota in encyclopaedias in contrast to textbooks, journal articles and test-manuals. All other types of publication are rarely cited (see Table 1).

Table 1. Means and standard deviations of the number of cited references, self-citations, publication language of references, references to the same journal/book/manual, and types of publications cited as well as results of analyses of variance for journal articles, books, and test-manuals

Variable	Journal articles:			Analysis of variance ^a			Books:			Analysis of variance ^a			Test-manuals:			Analysis of variance	
	M	SD	%	Discipline F(2/72)	Language F(1/72)	Year F(2/72)	M	SD	%	Discipline F(5/10)	Type (F2/10)	M	SD	%	Discipline F(4/5)		
Total no. of references	39.2	27.3	100	6.14**	0.05	3.72*	347.4	146.4	100	0.93	5.93*	24.5	32.0	100	1.80		
No. of self-references	4.3	3.8	11	1.76	2.74	2.71	25.4	18.6	7	0.28	1.23	4.4	5.7	18	1.46		
No. of references in same journal/book/manual	3.8	4.6	10	6.79**	67.30**	3.92*	0.2	0.5	0	1.00	2.14	0.0	0.0	0	—		
No. of German ref.	5.7	8.0	15	3.03	97.12**	0.45	115.3	97.6	33	2.33	7.42*	9.4	12.6	38	1.88		
No. of English ref.	33.5	25.4	86	5.71	7.37**	4.18*	230.0	138.0	66	1.66	1.06	15.1	26.1	62	0.99		
No. of other than German and English ref.	0.1	0.2	0	2.25	2.25	2.25	2.4	6.3	1	1.13	1.76	0.1	0.3	0	1.00		
<i>Publication types of references cited</i>																	
Journal-articles	19.1	16.6	49	7.57**	0.01	4.31*	181.4	113.7	52	1.20	1.97	15.9	27.4	65	1.06		
Authored books	7.9	11.1	20	2.20	3.41	0.77	80.2	55.3	23	1.79	7.04*	3.1	3.5	13	4.28		
Book-chapters	7.9	13.2	20	1.21	1.37	1.88	64.6	35.5	19	3.14	4.22*	2.3	2.2	9	2.31		
Conference proceedings	1.6	11.6	4	1.14	0.93	1.20	1.3	1.4	0	0.29	0.42	0.3	0.7	1	9.00*		
Unpublished papers	0.8	1.2	2	5.06**	2.30	0.63	1.8	3.4	1	0.94	7.77**	0.0	0.0	0	—		
Manuscripts in press	0.6	1.1	2	0.16	0.25	0.48	0.2	0.6	0	1.00	4.00	0.3	1.0	1	1.00		
Textbooks	0.5	1.2	1	3.34*	0.01	0.82	2.4	3.0	1	0.73	2.27	0.0	0.0	0	—		
Edited books	0.4	1.6	1	0.31	1.89	0.90	6.6	6.5	2	0.28	0.45	0.5	1.3	2	0.88		
Institute Reports	0.4	0.9	1	0.28	1.36	0.04	4.6	6.2	1	2.45	1.66	1.1	2.2	5	0.70		
Test-manuals	0.0	0.0	0	—	—	—	2.7	4.3	1	0.85	0.13	1.0	2.2	4	1.51		
Videos	0.0	0.0	0	—	—	—	0.1	0.3	0	0.73	0.46	0.0	0.0	0	—		
MANOVA-F ^a df ₁ /df ₂				18/130	1.50	1.31				508	20/2				0.74	20/4	

**p < 0.01; *p < 0.05; ^a All interaction-terms do not reach statistical significance (p > 0.10).

Table 2. Means and standard deviations of the number of citations and types of citations in the text as well as results of analyses of variance for journal articles, books, and test-manuals

Variable	Journal articles:			Analysis of variance ^a				Books:			Analysis of variance ^a			Test-manuals:			Analysis of variance Discipline F(4/5)
	M	SD	%	Discipline F(2/72)	Language F(1/72)	Year F(2/72)	M	SD	%	Discipline F(5/10)	Type (F2/10)	M	SD	%			
Total number of citations in the text	66.2	47.2	100	4.59*	0.69	3.13*	451.6	176.7	100	1.43	10.38*	30.1	40.0	100	1.98		
Types of citations in the text																	
Reference to theory	13.4	13.5	20	3.26*	3.10	1.83	140.0	65.2	31	2.71	3.20	2.7	5.5	9	0.75		
Reference to method	5.8	6.5	9	1.98	0.10	1.49	23.6	16.2	5	2.04	1.00	3.5	5.6	12	2.85		
Reference to empirical result	20.1	20.0	30	3.91*	11.71**	1.50	139.3	85.5	31	0.92	1.53	12.9	17.9	43	3.24		
Adoption of an assessment method	2.2	2.8	3	9.83*	0.41	2.70	0.1	0.2	0	1.00	1.00	0.0	0.0	0	--		
Adoption of a statistical data analysis method	1.4	2.0	2	0.27	2.33	5.82**	0.1	0.5	0	1.00	1.00	0.0	0.0	0	--		
Adoption of a table, figure or listing	0.1	0.4	0	1.00	0.33	1.00	10.8	13.7	2	1.30	3.91	0.2	0.4	1	0.75		
Word-to-word citations	2.1	3.4	3	1.64	3.73	0.03	12.0	12.2	3	5.35*	8.26**	0.0	0.0	0	--		
Theoretical or methodological criticism of reference	0.5	1.2	1	2.55	2.01	2.19	3.8	5.3	1	1.36	2.00	0.5	1.4	2	1.00		
Overview-citations	2.9	4.0	4	1.07	0.45	3.69*	12.9	10.0	3	1.53	0.38	1.4	2.8	5	0.71		
Perfunctory citations	16.6	24.1	25	1.13	3.26	1.45	108.9	95.7	24	0.44	9.55**	8.8	16.9	29	0.91		
Remaining rest	1.1	1.6	2	0.12	0.01	1.53	0.2	0.7	0	1.00	1.00	0.0	0.0	0	--		
MANOVA-F ^a df ₁ /df ₂				2.78** 22/126	3.66** 11/62	1.96* 22/126				0.72 50/8	2.08 20/2				2.88 20/4		

**p < 0.01; *p < 0.05; ^a All interaction-terms do not reach statistical significance (p > 0.10).

Citation-types: How much and in what quality is cited in texts?

The results on the *total number of citations in the texts* (see Table 2) are in accordance with the results on the total number of references (see above). However, it can be noted that on average each reference listed is cited 1.7-times in the text of journal articles, 1.3-times in the text of books (significantly more in encyclopaedias than in textbooks), and 1.2-times in the text of test-manuals. In journal articles this frequency of citing the same source more often in a text has increased over time and it is significantly higher in personality psychology journals than in social and developmental psychology journals (see Table 2).

At first glance, the results for the *quality or different types of citations in the texts* (see Table 2) all combined point at a good validity of citation indices, since most citations in all types of publications refer directly to empirical results, theories or concepts, methods or adoptions from the references listed. Together with word-to-word citations, which are rarely made anyhow, but can be found somewhat more frequent in encyclopaedias than in textbooks, these *high-quality citations* represent more than 70% of all citations. Theoretical or methodological criticism of references (1–2%) as well as overview-citations (3–5%) are very rare. However, the quota of *perfunctory citations* without any further reference to the source cited varies from 24% (more in encyclopaedias than in textbooks) over 25% in journal articles to 29% in test-manuals – without any significant differences to be found between psychological sub-disciplines and publication languages as well as publication years (in journal articles).

However, some minor statistical significant differences in citation types in journal articles are observed: in articles on personality psychology direct references to theories and concepts (22%), empirical results (35%) as well as adoptions of assessment methods (5%) are more frequent than in articles on social psychology (16%; 26%; 1%) and on developmental psychology (14%, 28%; 2%). Citations in English journal articles refer significantly more frequent to empirical results of the publication cited (39% in contrast to 21% in German journal articles). Over time, there are slight, but significant increases in citations referring to the adoption of statistical data analysis methods (1985: 1%; 1990: 2%; 1995: 4%) and to overview literature (1985: 2%; 1990: 3%; 1995: 8%).

Discussion and conclusions

The content analytical results presented confirm, exemplarily for psychological publications, the validity of quantitative citation counting by means of citation-databases to a certain extent. Approximately 70% of all citations analyzed are high-quality citations with precise functions referring closely to empirical results, theories, methods or adoptions of methods presented in the references cited. This confirms the normative theory of citing (see, e.g., CRONIN, 1984, for an overview).

Word-to-word citations are rarely made in psychological publications. The same is true for critical, negative citations. However, 25% of the citations in the texts are perfunctory having “little information utility” (LIU, 1993, p. 390). Other than the indication of the source in the text, there is not any further reference to its contents. Therefore, validity of automatic citation counting is limited for psychological publications up to 75% of all citations. That is the clear majority of cites in psychological publications. However, it must be considered that at least 25% of all citations are low-quality references without scientific functions, but – perhaps – rather social functions outside the scientific work being in the focus of the social constructive views of citing (BROOKS, 1986, 1988; BONZI & SNYDER, 1991; for an overview, see CRONIN, 1984).

Compared to other science disciplines, perfunctory citations are more frequent in psychology than in social sciences (3–8%; PERITZ, 1983) and physics (20%; CHUBIN & MOITRA, 1975). In psychology critical, negative citations are less frequent (1–2%) than in physics (5%; CHUBIN & MAITRA, 1975). Merely the quota of 10% self-references – which must be deleted in citation counting – is similar to those found in other science disciplines (see GARFIELD, 1979).

In addition, the results presented show that the existing citation-databases represent and analyze the publication type of journal articles with the most frequent citations. Nevertheless, by this they represent and analyze only half of the references made, at least for psychological publications, thus decreasing the representativeness of citation counting computed by these databases for references in psychology for all publication types. Completions of citation-databases by the references listed in authored books, textbooks, encyclopaedias, edited books, book-chapters and test-manuals are strongly needed, especially due to the lasting and widely spreading effects of citations made in these types of publications reaching frequently beyond the short-term actuality of journal articles. Journal articles are relevant for the rapid publication of new results, theories and methodologies. However, most of them are forgotten soon after publication, unless they find reference and citation in encyclopaedias, textbooks, authored and edited books, book-chapters and test-manuals.

References

- ARISTOTLE (undated/1959), *Über die Seele (De anima)* [= E. Gruber (Hrsg.), Werke Aristoteles, Bd. 13], Wissenschaftliche Buchgesellschaft, Darmstadt.
- BAGBY, R. M., PARKER, J. D., BURY, A. S. (1990), A comparative citation analysis of attribution theory and the theory of cognitive dissonance, *Personality and Social Psychology Bulletin*, 16: 274-283.
- BONZI, S., SNYDER, H. W. (1991), Motivations for citation: A comparison of self citation and citation of others, *Scientometrics*, 21 : 245–254.
- BROOKS, T. A. (1986), Evidence of complex citer motivations, *Journal of the American Society for Information Science*, 37 : 34–36.

- BROOKS, T. A. (1988), Citer motivations. In: A. KENT (Ed.), *Encyclopedia of Library and Information Science, Volume 43*. Marcel Dekker, New York, NY, pp. 48–59.
- BROŽEK, J. (1980), The echoes of Wundt's work in the United States, 1887–1977: A quantitative citation analysis, *Psychological Research*, 42 : 103–107.
- CHUBIN, D. E., MOITRA, S. D. (1975), Content analysis of references: Adjunct or alternative to citation counting? *Social Studies of Science*, 5 : 423–441.
- COLE, J., COLE, S. (1971), Measuring the quality of sociological research: Problems in the use of the Science Citation Index, *American Sociologist*, 6 : 23–29.
- CRONIN, B. (1984), *The Citation Process: The Role and Significance of Citations in Scientific Communication*, Taylor Graham, London, Great Britain.
- ENDLER, N. S., RUSHTON, J. P., ROEDIGER, H. L. (1978), Productivity and scholarly impact (citations) of British, Canadian, and U.S. Departments of Psychology (1975), *American Psychologist*, 33 : 1064–1082.
- GARFIELD, E. (1979), *Citation Indexing: Its Theory and Application in Science, Technology, and Humanities*, Wiley, New York, NY.
- GRAY, P. H. (1983), Using science citation analysis to evaluate administrative accountability for salary variance, *American Psychologist*, 38 : 116–117.
- LIU, M. (1993), Progress in documentation – The complexities of citation practice: A review of citation studies, *Journal of Documentation*, 49 : 370–408.
- MAY, R. M. (1997), The scientific wealth of nations, *Science*, 275 : 793–796.
- MCPHERSON, A., BONEM, M., GREEN, G., OSBORNE, J. G. (1984), A citation analysis of the influence on research of Skinner's Verbal Behavior, *Behavior Analyst*, 7 : 157–167.
- MORAVSIK, M. J., MURUGESAN, P. (1975), Some results on the function and quality of citations, *Social Studies of Science*, 5 : 86–92.
- PERITZ, B. (1983), A classification of citation roles for the social sciences and related fields, *Scientometrics*, 5 : 303–312.
- PERLMAN, D. (1984), Recent developments in personality and social psychology: A citation analysis, *Personality and Social Psychology Bulletin*, 10 : 493–501.
- SCHUI, G., KRAMPEN, G. (2006), Möglichkeiten und Grenzen der Anwendung bibliometrischer Indikatoren im Rahmen von Evaluationsvorhaben in der deutschsprachigen Psychologie (Possibilities and limits of applications of bibliometrical indicators within evaluations of psychology). In: G. KRAMPEN, H. ZAYER (Eds), *Didaktik und Evaluation in der Psychologie (Teaching methods and evaluation in psychology)*. Hogrefe, Göttingen (Germany), pp. 11–26.

Appendix 1

Text material of authored and edited textbooks and encyclopaedias

- AMELANG, M., BARTUSSEK, D. (2001), *Differentielle Psychologie und Persönlichkeitsforschung* (Differential psychology and personality research) (5th ed.), Kohlhammer, Stuttgart (Germany).
- BAUMANN, U., PERREZ, M. (Eds) (1998), *Lehrbuch Klinische Psychologie – Psychotherapie* (Textbook clinical psychology – psychotherapy) (2nd ed.), Huber, Bern (Switzerland).
- BIRBAUMER, N., SCHMIDT, R. (2003), *Biologische Psychologie* (Biological psychology) (5th ed.), Springer, Berlin (Germany).
- BIRBAUMER, N., FREY, D., KUHLE, J., SCHNEIDER, W., SCHWARZER, R. (Eds) (1994-1997), *Enzyklopädie der Psychologie: Pädagogische Psychologie* (Encyclopedia of psychology: Educational psychology) (Serie D/I, Bd. 1-4), Hogrefe, Göttingen (Germany).
- BIRBAUMER, N., FREY, D., KUHLE, J., SCHNEIDER, W., SCHWARZER, R. (Eds) (1996-2000), *Enzyklopädie der Psychologie: Differentielle Psychologie und Persönlichkeitsforschung* (Encyclopedia of Psychology: Differential psychology and personality research) (Serie C/VIII, Bd. 1-4), Hogrefe, Göttingen (Germany).
- BIRBAUMER, N., FREY, D., KUHLE, J., SCHNEIDER, W., SCHWARZER, R. (Eds) (1996-2001), *Enzyklopädie der Psychologie: Klinische Psychologie* (Encyclopedia of psychology: Clinical psychology) (Serie D/II, Bd. 1-4), Hogrefe, Göttingen (Germany).
- BIRBAUMER, N., FREY, D., KUHLE, J., SCHNEIDER, W., SCHWARZER, R. (Eds) (1996-2002), *Enzyklopädie der Psychologie: Biologische Psychologie* (Encyclopedia of psychology: Biological psychology) (Serie C/I, Bd. 1-7), Hogrefe, Göttingen (Germany).
- DAVISON, G., NEALE, J., HAUTZINGER, M. (2002), *Klinische Psychologie* (Clinical psychology) (6th ed.), Beltz, Weinheim (Germany).
- EHLERT, U. (Ed.) (2003), *Verhaltensmedizin* (Behavioral medicine), Springer, Berlin (Germany).
- FREY, D., IRLE, M. (Eds) (1998/2002), *Theorien der Sozialpsychologie* (Theories of social psychology) (3 Vol.), Huber, Bern (Switzerland).
- GRAUMANN, C. G. (Ed.) (1972/1975), *Sozialpsychologie* (Social psychology) [= Gottschaldt, K., Lersch, P., Sander, F., Thomae, H. (Eds) Handbuch der Psychologie in 12 Bänden, Bd. 7(1) und Bd. 7(2)], Hogrefe, Göttingen (Germany).
- HERKNER, W. (2001), *Lehrbuch Sozialpsychologie* (Textbook social psychology) (2nd ed.), Huber, Bern (Switzerland).
- HERRMANN, T., LANTERMANN, E.-D. (Eds) (1985), *Persönlichkeitspsychologie* (Psychology of personality), Urban & Schwarzenberg, München (Germany).
- KRAPP, A., WEIDENMANN, B. (Eds) (2001), *Pädagogische Psychologie* (Educational psychology) (4th ed.), Beltz, Weinheim (Germany).
- OERTER, R., MONTADA, L. (Eds) (2002), *Entwicklungspsychologie* (Developmental psychology) (5th ed.), Beltz, Weinheim (Germany).
- TAUSCH, R., TAUSCH, A. (1998), *Erziehungspsychologie* (Psychology of education) (11th ed.), Hogrefe, Göttingen (Germany).
- THOMAE, H. (Ed.) (1959), *Entwicklungspsychologie* (Developmental psychology) [= Gottschaldt, K., Lersch, P., Sander, F., Thomae, H. (eds) Handbuch der Psychologie in 12 Bänden, Bd. 3], Hogrefe, Göttingen (Germany).
- TRAUTNER, H. M. (1992), *Lehrbuch der Entwicklungspsychologie* (Textbook developmental psychology) (2 Vol., 2nd ed.), Hogrefe, Göttingen (Germany).

Appendix 2

Text material of test-manuals

- BORKENAU, P., OSTENDORF, F. (1993), *Neo-Fünf-Faktoren-Inventar* (Neo-Five-Factors-Inventory) NEO-FFI), Hogrefe, Göttingen (Germany).
- FAHRENBERG, J., HAMPEL, R., SELG, H. (2001), *Freiburger Persönlichkeitsinventar* (Freiburg Personality-Inventory) (FPI-R; 7th ed.), Hogrefe, Göttingen (Germany).
- FRANKE, G. H. (2002), *Die Symptom-Checkliste von L.R. Derogatis* (Symptom-Checklist) (SCL-90-R; 2nd ed.), Beltz, Weinheim (Germany).
- GRIMM, H., SCHÖLER, H. (1991), *Heidelberger Sprachentwicklungstest* (Heidelberg language development test) (HSET; 2nd ed.), Hogrefe, Göttingen (Germany).
- KASTNER-KOLLER, V., DEIMANN, P. (1998), *Der Wiener Entwicklungstest* (Vienna development test) (WET), Hogrefe, Göttingen (Germany).
- KROHNE, H.-W., PULSACK, A. (1995), *Erziehungstilinventar* (Education-style inventory) (ESI; 2nd ed.), Beltz, Weinheim (Germany).
- MÜLLER, R. (1980), *Diagnostisches Soziogramm* (Diagnostic sociogram), Westermann, Braunschweig (Germany).
- ROSENZWEIG, S., HÖRMANN, H., MOOG, W. (1957), *Rosenzweig P-F Test, Form für Erwachsene* (Rosenzweig P-F Test, Adults) (PFT), Hogrefe, Göttingen (Germany).
- TEWES, U., ROSSMANN, P., SCHALLBERGER, U. (2000), *Hamburg-Wechsler-Intelligenztest für Kinder* (Hamburg-Wechsler-Intelligence-Test for Children) (HAWIK-III; 3rd ed.), Huber, Bern (Switzerland).
- WITTCHEN, H.-U., ZAUDIG, M., FYDRICH, T. (1997), *Strukturiertes Klinisches Interview für DSM IV – Achsen I und II* (Structured clinical interview for DSM-IV, Axis I and II) (SKID), Hogrefe, Göttingen (Germany).