

An analysis of citation functions in the humanities and social sciences research from the perspective of problematic citation analysis assumptions

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Abstract Citation analyses are based on two questionable assumptions that significantly influence the value of citation count: the equal contribution assumption (i.e., each citation contributes equally to the citing paper) and the positive endorsement assumption (i.e., each citation is viewed as an endorsement from the citing paper to the cited work). This study employed a citation context analysis approach to examine the distributions of essential versus perfunctory citations as well as confirmative versus negational citations in humanities and social sciences (H&SS) research articles to determine to what extent the two problematic assumptions affect the validity of citation analyses in those fields. The sample comprises 360 articles representing six subject areas: Chinese literature, history, arts (i.e., the humanities subjects); sociology, economics, and psychology (i.e., the social sciences subjects). Excluding citations to primary sources—e.g., manuscripts, archival materials, monographs that were the subjects of study rather than information sources, a total of 25,617 in-text bibliographic citations were analyzed. The findings show that the distributions of citation functions for those six subject fields were all significantly different, meaning that disciplinary differences exist in H&SS citations. Also, for the H&SS fields, perfunctory citations may have inflated the contribution of the cited works much more than negational citations.

Keywords Citation function · Citation analysis · Perfunctory citations · Negational citations · Humanities and social sciences

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Introduction

Citations form the basis of bibliometrics-based research evaluation. Citations are often viewed as an objective and effective indicator of the impact of cited works on citing papers. However, this idea is not without problems. Citation analyses often hold an equal contribution assumption, in which all citations in a paper are considered to have equivalent impact on that paper. In reality, not all citations contribute equally to the citing paper. Citations are also usually assumed to be the citing authors' positive endorsement of the cited works. In many instances, citations are used to validate assumptions or to give credit to earlier works upon which the study builds, but other instances occur where authors cite to disapprove or challenge a previous work.

Bibliometrics research and citation-based research evaluation have developed on these problematic assumptions. Previous studies found that perfunctory citations, citations which do not directly lay the foundations of citing papers, constituted a large proportion of citations in physics papers; negational citations, citations the authors use to object to or question cited papers, also accounted for roughly 5–10% of the total citations (Chubin and Moitra 1975; Murugesan and Moravcsik 1978).

In the humanities and social sciences (H&SS), Frost (1979) examined a very small sample of German literature research journals. The findings showed that about 17.22% of citations could be considered perfunctory ("reference for further reading," "to acknowledge the pioneering work of other scholars," "to acknowledge intellectual indebtedness"); negational citations accounted for roughly 10%. However, that analysis was based on random selection of citations from each sample paper rather than on a comprehensive survey of all citations. Further, no information was given on the representativeness of the sample. Krampen and Montada (2002, as cited in Bornmann and Daniel 2008) analyzed psychology journals and found that the percentages of citations that can be viewed as perfunctory and negational were roughly 30% and 1%, respectively. A subsequent study of psychology journals showed that perfunctory citations, similarly, accounted for 29% (Krampen et al. 2007). Kim (2004) found that Korean social scientists' journal paper references consisted of 22.81% perfunctory citations. Stremersch et al. (2015) found roughly 31.8% perfunctory citations (including those offering general reviews) and 0.6% negational citations in marketing journals.

The previous literature has discussed the questionable citation analysis assumptions and the accompanying validity and applicability problems for the H&SS research (Harwood 2009; Hellqvist 2010; Lindgren 2011; MacRoberts and MacRoberts 1996). Given the limitations of the aforementioned studies, the extent to which the equal contribution assumption and the positive endorsement assumption create citation count problems for different H&SS fields remains opaque. Most previous studies focused only on one or a few somewhat homogeneous subject domains. Further, they varied in research design, which renders it difficult for systematic comparisons across subject disciplines.

H&SS researchers have very different argumentation styles and rhetorical strategies in academic writing both in comparison with scientists and among themselves. Citation motivations and citation patterns within the H&SS domains are highly diverse (Brooks 1985; Cronin 1982; Frost 1979; Harwood 2009; Hellqvist 2010; Kim 2004). Many citations in humanities papers and some in social sciences papers are references to primary sources (Frost 1979; Harwood 2009; Hellqvist 2010). The cited primary sources were either the subject of study or objects to be analyzed; they serve more as *data* for the analyses rather than *information sources*, more commonly known as secondary sources, whose ideas inspire the citing papers. The different roles the literature serves to the citing work lead to

very different meanings of a citation. In addition, the citation windows in H&SS can be extremely long (Cullars 1998; Ferrara and Bonaccorsi 2016). These factors complicate the reliability of citation counts and challenge the validity and applicability of citations as an indicator of scholarly communication impact in H&SS research.

This study aims to understand the extent to which citations referencing secondary sources in H&SS research offer essential and affirmative support to the citing paper. It employs a citation context analysis approach (Small 1982; Bornmann and Daniel 2008) to examine citation functions in 360 H&SS research articles written in Mandarin Chinese and published in Taiwan. Citation context analysis essentially applies content analysis methods to citations in academic papers. It has been used to study citation motivation and citation function (Bornmann and Daniel 2008). Citation function examines the utilities or effects of citations in scholarly discourses. Two forms of citation function are the degree of support a citation gives to the citing paper and whether an author affirms or negates the cited work. They are observable features of citation characteristics and can be objectively studied via citation context analysis.

This study draws on Moravcsik and Murugesan's (1975) conceptualization of citation function and focuses specifically on *essential versus perfunctory* citations as well as *confirmative versus negational* citations. Analyses of these two dimensions of citation function respond respectively to the concerns about the problematic assumptions of equal contribution and positive endorsement that significantly influence the reliability of citation counts in academic papers. Using this analytic framework, this study seeks to compare citation distributions in six selected H&SS subject fields to determine whether significant disciplinary differences exist in citation function patterns. The results will inform the validity and reliability of citation analyses for H&SS domains.

Research framework

Table 1 presents the coding scheme employed in this study. It was based on Moravcsik and Murugesan's (1975) conceptualization of citation function.

Essential citations

- Essential-Concept-Confirmative (ECC): a citation instance in which the cited work offers theories, concepts, opinions, or abstract ideas that substantially support the core thesis or the major arguments of the citing paper; the citing paper shows no objection to, or questioning of, the cited concept or ideas.
- Essential-Concept-Negational (ECN): a citation instance in which the citing paper disapproves or questions the theories, concepts, opinions, or abstract ideas from the

Table 1 The citation function coding scheme used in this study

	Confirmative	Negational
Essential		
Offer conceptual support	ECC	ECN
Support factual statement	EFC	EFN
Support methodology	EMC	EMN
Perfunctory	PC	PN

cited work, which substantially influences the development of the core thesis or major arguments of the citing paper.

- Essential-Factual-Confirmative (EFC): a citation instance in which the cited work offers factual statements regarding people, artefacts, phenomena, or other objective facts that substantially support the core thesis and/or major arguments of the citing paper; the citing paper shows no objection to, or questioning of, the cited statement.
- Essential-Factual-Negational (EFN): a citation instance in which the author disapproves or questions the factual statement from the cited work, which substantially influences the development of the core thesis or major arguments of the citing paper.
- Essential-Methodology-Confirmative (EMC): a citation instance in which the cited work offers substantial support to the research methods of the citing paper; the citing paper shows no objection to, or questioning of, the cited work.
- Essential-Methodology-Negational (EMN): a citation instance in which the citing paper disapproves or questions the cited work, which substantially influences the research design and research methods of the citing paper.

Perfunctory citations

- Perfunctory-Confirmative (PC): a citation instance in which the cited work offers secondary support to the citing paper that is not substantially related to the development of the core thesis or major arguments; examples include those citations used to contextualize research, to acknowledge previous related research, to provide information not related to the core thesis or major arguments, and those citations used purely as rhetorical decorations.
- Perfunctory-Negational (PN): a citation instance in which the cited paper disapproves or questions the cited work, but which does not influence, or is unrelated to, the core thesis or major arguments of the citing paper; examples include mentions of previous arguable research that helps set the stage for the current study but does not influence the research design or the development of the core thesis/major arguments of the citing paper.

The previous literature conceptualized citation function in different ways. The different classifications of citation function could hinder cross-discipline comparisons. A popular way to conceptualize citation function is based on how citations support discourse strategies. For example, an early study by Garfield (1965) listed fifteen reasons for scholars to reference citations, all of which describe how a citation supports the construction and development of a scholarly discourse (e.g., paying homage to pioneers, giving credit for related work, identifying methodology and equipment, providing background readings). Peritz (1983) proposed the following citation functions: setting the stage for the present study; background information; methodological support; comparative; argumental, speculative, hypothetical; documentary; historical; casual mentioning. The classifications of citation functions in Oppenheim and Renn (1978) and Ahmed et al. (2004) are also of this kind.

Some conceptualizations of citation function are highly subject-specific. For example, Frost (1979) developed a citation classification scheme specifically for literary research, which cannot be applied to subject areas outside of the humanities. In another study, Frost (1989) employed a much simpler, yet entirely different, typology to study citation functions in library science literature, containing topic-specific functions such as “description of a library/information system project or operation”.

Moravcsik and Murugesan (1975) adopted another approach to study citation function at a higher level of abstraction. In their framework, each citation provides multiple functions to the citing paper classified along four dichotomies. The first is the *conceptual versus operational* dichotomy. It concerns different types of support offered by citations. For the former, a concept or a theory from the cited paper influences the conceptualization of the citing paper; in contrast, in the latter case a concept or theory from the cited paper is mentioned only for comparison or to indicate the existence of alternative research approaches for the study topic. The second dichotomy differentiates *organic versus perfunctory* citations. It concerns varying levels of support offered by citations. For the former, a concept, theory, or result from the cited paper lays a foundation for the citing paper, providing substantial support; for the latter, citations are references “which are not really necessary for the development of the citing paper”; examples here include citations that put the citing paper in chronological context or those that provide information of minor importance. The third dichotomy is *evolutionary versus juxtapositional*. The former “deals with materials which contribute directly to the logical development of the subject of the citing paper.” The latter refers to references similar to perfunctory citations, which exist for comparative purposes or offer minor support and do not contribute directly to the development of the citing paper. Finally, the fourth dichotomy describes the citer’s attitude: *confirmative versus negational*. The former refers to situations in which citing papers show approval or a neutral attitude toward the cited papers. In contrast, the latter refers to situations in which citing papers disagree with or challenge the cited papers.

Moravcsik and Murugesan influenced subsequent work. For instance, Chubin and Moitra (1975) took the *confirmative versus negational* and the *organic versus perfunctory* dimensions and weaved them into a scheme of six mutually exclusive citation types, four of which were affirmative and two were negational. Based on the descending essentiality of a citation to the citing paper, the four affirmative citation functions include *basic* (highly essential), *subsidiary* (unrelated subject topic but still offering essential affirmation to the citing paper), *additional information*, and *perfunctory*. The negational functions included *partial negation* and *total negation*. They developed the classification scheme to address the same concern of this article, but focused on scientific papers. However, differentiating the levels of essentiality of a citation costs a huge amount in time and labor and judgments are highly subjective, thereby complicating data coding and analyses. For instance, it is not always easy to determine if a cited paper is topically related to the citing paper, thus making the differentiation of the basic and subsidiary citations difficult. There could also be a grey area between subsidiary citations and citations offering additional information. The assertiveness of a statement subjectively perceived by different readers can also influence each individual’s judgment of partial or total negation.

This study also took the two dimensions, essentiality of a citation and citer attitudes, from Moravcsik and Murugesan (1975). The other two dimensions were entirely ignored in this study because they are less related to the problem] of citation count reliability. Also Cano (1989) found them conceptually too fuzzy to differentiate in empirical analyses. This study differs from Chubin and Moitra (1975) in that the citation essentiality and citer attitude were treated as two dichotomies that intersect with each other to form a two dimensional matrix (shown in Table 1). As such, the citation functions were mutually exclusive. Beyond that, this study further examines whether an essential citation offers conceptual/theoretical, factual, or methodological support to the citing paper (Table 2).

It should be noted that not all citations show explicit approval or disapproval to cited works. There are neutral citations to which the citing authors hold a non-judgmental attitude. This study considers neutral citations to be implicit endorsements to the cited

Table 2 Distribution of bibliographic citations to secondary sources in notes and parentheses

	Chinese literature (<i>n</i> = 60)	History (<i>n</i> = 60)	Arts (<i>n</i> = 60)	Sociology (<i>n</i> = 60)	Economics (<i>n</i> = 60)	Psychology (<i>n</i> = 60)	Total (<i>N</i> = 360)
Number of footnotes/endnotes	4158	8243	2785	1600	888	11	17,685
Notes containing bibliographic citations	1647	2567	1771	902	338	6	7231
Number of bibliographic citations in the footnote/endnote format	1948	3605	2492	1527	660	8	10,240
Number of parentheses	68	0	1203	3568	2251	3843	10,933
Number of bibliographic citations in the bracket format	85	0	1612	4830	3172	5678	15,377
Total number of bibliographic citations to secondary sources	2033	3605	4104	6357	3832	5686	25,617
Average number of bibliographic citations to secondary sources	33.88	60.08	68.4	105.95	63.87	97.77	71.16

literature. If an author does not attempt to challenge a point raised in the cited work and presents it in a de facto manner, the citation still constitutes a positive force for knowledge development and/or persuasion for that citing paper. As such, in this study, as long as a citation does not carry a negational attitude, it is considered confirmative.

Research methods

This study adopted the citation context analysis method to analyze the citation functions in H&SS articles published in Taiwan. Six trained coders participated in the analyses. They analyzed a total of 25,617 citations referencing secondary sources from 360 research articles. The articles were sampled from eighteen H&SS journals, which represented six different H&SS fields. The research design is described as follow.

Source journals and sampling of journal articles

The researcher first used purposive sampling to select three representative research journals for each of the following six H&SS subject disciplines: Chinese literature, history, arts (i.e., the humanities subjects); and sociology, economics, psychology (i.e., the social

sciences subjects). Journal selection was based on the following authoritative journal sources: the 2012–2013 journal ranking reports, *THCI Core* (Taiwan Humanities Citation Index-Core), and *TSSCI* (Taiwan Social Sciences Citation Index), all published by the former National Science Council (now the Ministry of Science and Technology) in Taiwan. Journals included in those sources were generally considered to be the high-quality H&SS journals in Taiwan. The researcher purposefully selected the top journals in order to focus on the citation behaviors among major H&SS researchers, as their works are often the subject of citation analyses and citation counts.

The journals were selected by the order of rank in the subject-based journal ranking reports. When fewer than three journals were listed in the top level in the reports, one or two additional journals were selected from THCI or TSSCI. Consequently, the source journals were as follow:

- **Chinese literature:** *Bulletin of the Department of Chinese Literature N.T.U.* (ISSN 1013-2422); *Bulletin Of Chinese* (ISSN 1019-6706); *Journal of Chinese Literature of National Cheng Kung University* (ISSN 1817-0021)
- **History:** *Bulletin of the Institute of History and Philology Academia Sinica* (ISSN 1012-4195); *Bulletin of the Institute of Modern History Academia Sinica* (ISSN 1029-4740); *Bulletin of the Department of History of National Taiwan University* (ISSN 1012-8514)
- **Arts:** *Taida Journal of Art History* (ISSN 1023-2095); *Journal of Chinese Ritual, Theatre and Folklore* (ISSN 1025-1383); *Journal of Design* (ISSN 1606-8327)
- **Sociology:** *Taiwan Sociology* (ISSN 1680-2969); *Taiwanese Journal of Sociology* (ISSN 1011-2219); *Taiwan: A Radical Quarterly in Social Studies* (ISSN 1021-9528)
- **Economics:** *Academia Economic Papers* (ISSN 1018-161X); *Taiwan Economic Review* (ISSN 1018-3833); *Taiwan Economic Forecast and Policy* (ISSN 1729-8849)
- **Psychology:** *Chinese Journal of Psychology* (ISSN 1013-9656); *Indigenous Psychological Research in Chinese Societies* (ISSN 1029-8282); *Psychological Testing* (ISSN 1609-4905)

Systematic sampling was further used to draw sample articles from the 2006–2010 issues. For each journal, the total number of published articles was determined, excluding editorials, book reviews, commentaries, and other non-research papers. A total of 20 papers were then drawn with regular interval for each journal, beginning with the first found research article. As such, 60 sample papers were drawn for each H&SS subjects. A total of 360 papers were analyzed.

Identification of citations referencing secondary sources

Each article was carefully inspected to identify all the in-text citations referencing secondary sources. Most citations in the humanities journals appear in the form of footnotes or endnotes. Some social sciences articles (mostly sociology and economics articles) also employed footnote-style citations, while others cite in APA style-like parentheses. A note or parentheses may contain more than one bibliographic citation. This study identified 7231 notes that contained 10,240 citations to secondary sources and 10,933 parentheses that contained 15,377 citations. In total, 25,617 bibliographic citations to secondary sources were identified and numbered for subsequent data coding and analyses.

Data coding and inter-coder agreement

Citation context analysis involves the careful reading of an article to determine the function of each citation within its semantic context. Each paper was carefully read and independently analyzed by at least two trained coders; the function of each citation was determined using the coding scheme described above.

The coders were all library and information science students. Prior to data coding, all coders received three group training sessions in which they practiced coding eleven test papers (the test papers were not included in the final sample). In the training sessions the coders developed higher consensus on the working definitions of the codes. In actual coding, two coders worked together on an assigned article. They first read and coded the articles independently. They then compared results and discussed the differences in their initial coding and agreed upon an ultimate coding decision.

Discussions of initial coding results were considered appropriate for this study. During coder training the researcher found that, because research articles can be complicated in argumentation, coders may misread the context in their initial coding. They would willingly change codes after reasonable discussion. For the validity and quality of research results, discussions were thus permitted, but the coders were also reminded not to persuade but only inform their partner of the reasons for their judgments. When differences continued to exist, a third coder joined the coding for the non-consensus citations only. The intercoder reliability was calculated with the formulas introduced in Holsti (1969):

- Inter-judge agreement: $2M/(N1 + N2)$
- where M stands for the number of coding decisions on which the two judges are in agreement, and $N1$ and $N2$ refer to the number of coding decisions made by judge 1 & 2 respectively.
- Composite reliability coefficient:
- N (average inter-judge agreement)/[1 + ($N - 1$)(average inter-judge agreement)]
- where N stands for the number of coders.

Prior to coder discussions, the inter-judge agreement ranged 0.70–0.89 for the six subject fields. After reasonable discussions, the inter-judge agreement greatly increased, ranging from 0.94 to 0.99, and the reliability coefficient ranged from 0.982 to 1.0, exceeding the recommended threshold of 0.85 (Kassarjian 1977).

Results

Citation-level analyses

The distribution of essential and perfunctory citations

As Tables 3 and 4 show, of the 25,617 H&SS citations analyzed in this study, 17,207 (67.2%) were considered essential citations (6057 humanities citations plus 11,150 social sciences citations). Comparatively, the social sciences fields employed more essential citations than the humanities (70.2 vs. 62.2%). Among the humanities fields, Chinese literature had the highest percentage of essential citations (78.5%), while history had the lowest (52.9%). For the social sciences, both sociology and psychology used roughly 75% essential citations; economics had a much lower percentage than the other two (56.1%).

Table 3 Distribution of essential and perfunctory citations in humanities ($N = 9742$)

	Chinese literatures		History		Arts		Humanities (total)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Essential								
ECC	843	41.5	804	22.3	569	13.9	2216	22.7
EFC	719	35.4	918	25.5	1819	44.3	3456	35.5
EMC	0	0.0	2	0.1	108	2.6	110	1.1
ECN	29	1.4	140	3.9	20	0.5	189	1.9
EFN	5	0.2	42	1.2	35	0.9	82	0.8
EMN	0	0.0	1	0.0	3	0.1	4	0.0
(Subtotal)	1596	78.5	1907	52.9	2554	62.2	6057	62.2
Perfunctory								
PC	434	21.3	1553	43.1	1518	37.0	3505	36.0
PN	3	0.1	145	4.0	32	0.8	180	1.8
(Subtotal)	437	21.5	1698	47.1	1550	37.8	3685	37.8
Total	2033	100.0	3605	100.0	4104	100.0	9742	100.0

Table 4 Distribution of essential and perfunctory citations in social sciences ($N = 15,875$)

	Sociology		Economics		Psychology		Social sciences (total)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Essential								
ECC	1226	19.3	655	17.1	2223	39.1	4104	25.9
EFC	3342	52.6	844	22.0	1246	21.9	5432	34.2
EMC	90	1.4	624	16.3	692	12.2	1406	8.9
ECN	59	0.9	4	0.1	33	0.6	96	0.6
EFN	69	1.1	10	0.3	6	0.1	85	0.5
EMN	5	0.1	12	0.3	10	0.2	27	0.2
(Subtotal)	4791	75.4	2149	56.1	4210	74.0	11,150	70.2
Perfunctory								
PC	1527	24.0	1672	43.6	1464	25.7	4663	29.4
PN	39	0.6	11	0.3	12	0.2	62	0.4
(Subtotal)	1566	24.6	1683	43.9	1476	26.0	4725	29.8
Total	6357	100.0	3832	100.0	5686	100.0	15,875	100.0

Looking across the two tables it is noteworthy that the average percentages of essential citations used for supporting conceptual, factual, or methodological claims were similar between humanities and social sciences, although social sciences did have a higher percentage for methodological usages (8.9%). However, if we look closely at the subject fields within the two groups, sharper contrasts emerge. For example, Chinese literature studies

employed more citations supporting concepts, while arts studies employed a larger proportion of citations to support factual claims (Table 3). For the social sciences fields, the percentages for ECC and EFC were also very different. Further, sociology employed a surprisingly lower percentage of citations in supporting research methodologies as opposed to the other two fields (Table 4). These findings indicate that the citation behaviors of H&SS researchers were diverse and heterogeneous.

The distribution of confirmative and negational citations

Of the 25,617 H&SS citations, the majority were confirmative citations; only 725 citations (2.83%) were negational. Comparing Tables 5 and 6, one sees that the humanities combined employed a slightly higher percentage of negational citations than the social sciences (4.17 vs. 1.70%). History stood out among those H&SS fields for its noticeably higher percentage of negational citations, accounting for 9.1% of its total citations. One in every eleven citations in history papers was negational.

The differences among the H&SS researchers' citation behaviors

Table 7 shows the average numbers, standard deviations, and ratios of essential versus perfunctory citations as well as confirmative versus negational citations. Excluding citations to primary sources, the humanities researchers referenced less previous scholarly literature than the social scientists, and the standard deviation shows humanities papers varied greatly in the numbers of citations to secondary sources, particularly with essential citations.

Observing the ratio of essential citations versus perfunctory citations, humanities researchers combined employed more perfunctory citations than social scientists, but behavior varied greatly between the humanities fields. History had a much higher ratio of

Table 5 Distribution of confirmative and negational citations in humanities ($N = 9742$)

	Chinese literatures		History		Arts		Humanities (total)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Confirmative								
ECC	843	41.5	804	22.3	569	13.9	2216	22.7
EFC	719	35.4	918	25.5	1819	44.3	3456	35.5
EMC	0	0.0	2	0.1	108	2.6	110	1.1
PC	434	21.3	1553	43.1	1518	37.0	3505	36.0
(Subtotal)	1996	98.2	3277	90.9	4014	97.8	9287	95.3
Negational								
ECN	29	1.4	140	3.9	20	0.5	189	1.9
EFN	5	0.2	42	1.2	35	0.9	82	0.8
EMN	0	0.0	1	0.0	3	0.1	4	0.0
PN	3	0.1	145	4.0	32	0.8	180	1.8
(Subtotal)	37	1.8	328	9.1	90	2.2	455	4.7
Total	2033	100.0	3605	100.0	4104	100.0	9742	100.0

Table 6 Distribution of confirmative and negational citations in social sciences ($N = 15,875$)

	Sociology		Economics		Psychology		Social sciences (Total)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Confirmative								
ECC	1226	19.3	655	17.1	2223	39.1	4104	25.9
EFC	3342	52.6	844	22.0	1246	21.9	5432	34.2
EMC	90	1.4	624	16.3	692	12.2	1406	8.9
PC	1527	24.0	1672	43.6	1464	25.7	4663	29.4
(Subtotal)	6185	97.3	3795	99.0	5625	98.9	15,605	98.3
Negational								
ECN	59	0.9	4	0.1	33	0.6	96	0.6
EFN	69	1.1	10	0.3	6	0.1	85	0.5
EMN	5	0.1	12	0.3	10	0.2	27	0.2
PN	39	0.6	11	0.3	12	0.2	62	0.4
(Subtotal)	172	2.7	37	1.0	61	1.1	270	1.7
Total	6357	100.0	3832	100.0	5686	100.0	15,875	100.0

perfunctory citation usage, while Chinese literature was the lowest. Economics also stood out in the social sciences for its higher ratio of perfunctory citation usage. As to negational citations, only history looked uniquely higher than the others. Chi square tests indicated that disciplinary differences existed in citation usage (Table 8). Significant differences existed in the citation distributions of the six subjects. Significant differences also existed when comparing the humanities and social sciences as two larger subject domains and between the three subject fields within each domain. The Cramers' V values indicated weak to moderate associations between subject discipline and citation usage; however, the Phi values indicated very weak or little association between citation usage and the binary division of humanities and social sciences. The results suggest that the validity and reliability of citation count as a bibliometric indicator are indeed questionable for H&SS as citation use pattern does vary from subject discipline to subject discipline.

Article-level analyses

Article-level analyses focused on whether a particular citation function was present in an article regardless of the number of occurrences of that function. Table 9 shows that distribution. Looking at the confirmative citations in the matrix, it wasn't surprising to see that almost all the articles employed at least one essential-confirmative citation. Only one paper in Chinese literature and one paper in history did not include any essential-confirmative citations to secondary literature; all essential-confirmative citations in those two papers were to primary sources. In perfunctory-confirmative citations, Chinese literature was noticeably lower than the other subjects.

As to the use of negational citations, history, sociology, and arts had larger numbers of articles containing at least one negational citation. Sociologists, in particular, cite to negate previous literature as frequently as historians do. Chinese literature and economics studies

Table 7 The averages, standard deviations, and ratios of the citation functions

	Essential		Perfunctory		Ratio (E:P)	Confirmative		Negational		Ratio (C:N)	Total	
	Avg.	SD	Avg.	SD		Avg.	SD	Avg.	SD		Avg.	SD
Chinese literatures	26.60	21.44	7.28	8.28	1:0.27	33.27	24.29	0.62	1.24	1:0.02	33.88	24.56
History	31.78	23.28	28.30	20.04	1:0.89	54.62	33.41	5.47	8.08	1:0.10	60.08	36.51
Arts	42.57	46.97	25.83	22.46	1:0.61	66.90	58.99	1.50	2.67	1:0.02	68.40	59.41
Humanities (subtotal)	33.65	33.19	20.47	20.24	1:0.61	51.59	43.63	2.53	5.37	1:0.05	54.12	44.93
Sociology	79.85	39.29	26.10	23.91	1:0.33	103.37	51.65	2.58	3.95	1:0.02	105.95	53.75
Economics	35.82	23.70	28.05	20.29	1:0.78	63.25	32.42	0.62	1.57	1:0.01	63.87	32.63
Psychology	70.17	41.65	24.60	18.89	1:0.35	93.75	44.23	1.02	2.20	1:0.01	94.77	44.68
Social sciences (subtotal)	61.94	40.31	26.25	21.07	1:0.42	86.69	46.63	1.50	3.10	1:0.02	88.19	47.75
Total	47.80	39.50	23.36	20.83	1:0.49	69.14	48.40	2.01	4.41	1:0.03	71.16	49.34

Table 8 Chi square tests for the distributions of citation functions at the citation level

	χ^2	df	p	Cramers' V	Phi
Essential versus perfunctory					
Among all subjects	1025.867	5	.000***	.200	–
Between humanities and social sciences	177.946	1	.000***	–	.083
Among the humanities subjects	362.420	2	.000***	.193	–
Among the social sciences subjects	486.720	2	.000***	.175	–
Confirmative versus negational					
Among all subjects	659.127	5	.000***	.160	–
Between humanities and social sciences	212.666	1	.000***	–	.091
Among the humanities subjects	252.434	2	.000***	.161	–
Among the social sciences subjects	48.390	2	.000***	.055	–
EC versus EN versus PC versus PN					
Among all subjects	1706.197	15	.000***	.149	–
Between humanities and social sciences	391.947	3	.000***	.124	–
Among the humanities subjects	612.197	6	.000***	.177	–
Among the social sciences subjects	537.252	6	.000***	.130	–

*** $p < .001$
Table 9 Distribution of citation functions at the article level ($n = 60$ for each subject field)

	Confirmative (n ; %)			Negational (n ; %)		
Essential	Chinese literature (59; 98.3%)	History (59; 98.3%)	Arts (60; 100%)	Chinese literature (15; 25.0%)	History (33; 55.0%)	Arts (22; 36.7%)
	Sociology (60; 100%)	Economics (60; 100%)	Psychology (60; 100%)	Sociology (30; 50.0%)	Economics (13; 21.7%)	Psychology (17; 28.3%)
Perfunctory	Chinese literature (51; 85.0%)	History (59; 98.3%)	Arts (59; 98.3%)	Chinese literature (3; 5.0%)	History (34; 56.7%)	Arts (9; 15.0%)
	Sociology (60; 100%)	Economics (60; 100%)	Psychology (58; 96.7%)	Sociology (9; 15.0%)	Economics (4; 6.7%)	Psychology (3; 5.0%)

continued to be the lowest in negational uses in H&SS. History was also high in perfunctory-negational citations, while the other five subjects were rather low.

Because the number of articles with confirmative citations were all very close for the six subjects, Chi square tests were used only to examine the distributions of negational citations. As Table 10 shows, humanities and social sciences as two larger fields did not show significant difference in their negational citation and essential-negational citation usages, but in perfunctory-negational citation usage, the two larger fields varied significantly. At the smaller subject field level, most of the comparisons showed significant differences, and

Table 10 Chi square tests for the distributions of negational citations at the article level

	χ^2	df	p	Cramers' V	Phi
Presence versus absence of negational citation					
Among all subjects	38.897	5	.000***	.329	–
Humanities versus social sciences	2.915	1	.088	–	–
Among humanities subjects	21.830	2	.000***	.348	–
Among social sciences subjects	14.228	2	.001**	.281	–
Presence versus absence of essential-negational citation					
Among all subjects	23.449	5	.000***	.255	–
Humanities versus social sciences	1.462	1	.227	–	–
Among humanities subjects	11.548	2	.003**	.253	–
Among social sciences subjects	10.489	2	.005**	.241	–
Presence versus absence of perfunctory-negational citation					
Among all subjects	83.161	5	.000***	.481	–
Humanities versus social sciences	17.536	1	.000***	–	.221
Among humanities subjects	47.365	2	.000***	.513	–
Among social sciences subjects	4.253	2	.119	–	–

* $p < .05$; ** $p < .01$; *** $p < .001$

the Cramers' V values indicated moderate to strong associations between subject and negational citation usage. In negational citation and essential-negational citation usages, significant differences existed within humanities and within social sciences, and the associations between subject and citation usage ranged from moderate to moderately strong. In perfunctory-negational citation usage, however, the humanities were very different from the social sciences. The humanities subjects were significantly different in this particular kind of citation usage, and Cramer's V values suggested very strong association between subject and citation usage in the humanities subjects. In contrast, the social sciences subjects showed no significant difference in perfunctory-negational citation usage.

Discussion and conclusion

Compared to the previous limited studies using similar research design, the findings of this study surprisingly suggest that the problems of the equal contribution and positive endorsement assumptions in H&SS may not be as serious as in the sciences. Chubin and Moitra (1975) found that in high energy physics perfunctory-confirmative citations (i.e., affirmative citations offering “additional information” are “perfunctory” in their words) accounted for 53.1% of the total citations; negational citations accounted for 5%. Murugesan and Moravcsik (1978) found that, in high energy physics, nuclear physics, and solid state physics, the percentages of perfunctory citations could be as high as 53, 66, and 71% respectively; for negational citations, it could be as high as 9, 11, and 10%. In contrast, as the citation-level analyses of this study show, the percentages of perfunctory citations in these six H&SS subjects were all lower than 50%. For negational citations,

only history reached a higher percentage of 9.1%; the other five fields all saw less than 3% of negational citations.

Given the lower percentages of perfunctory and negational citations, however, the findings of this study should not be taken lightly as an endorsement of citation count as an effective impact indicator for H&SS. Other problems continue to limit and challenge the validity and applicability of citation count for measuring research impact in H&SS. For example, unlike the STEM (science-technology-engineering-medicine) disciplines that rely almost exclusively on journals as the means for scholarly communication, the H&SS disciplines are known to use a wider corpus of literature sources for information and inspiration, including scholarly and popular monographs (Huang and Chang 2008). H&SS scholars also employ a much larger proportion of non-English literatures than STEM researchers (Huang and Chang 2006). The coverage of the existing large and international citation indexes do not fully represent the sources of information and inspiration for H&SS research as their journal selections for the H&SS fields are usually more limited than STEM disciplines, and the included journals are also predominantly in English. This well-known limitation of citation databases continues to seriously limit the validity of using citation count as an impact indicator for most H&SS disciplines. Other problems also constrain the validity of citation-based measures for H&SS, including extremely skewed citation patterns, highly diverse citation motivations, complex citation behavior, and very long citation windows (Ferrara and Bonaccorsi 2016).

The significant differences in the distributions of citation functions found in the six H&SS subjects studied, also indicate limitations of using citation for measuring impact. The H&SS researchers are not homogenous in their citation behavior. As the citation-level analyses show, history and economics researchers demonstrate comparatively higher usage of perfunctory citation than the other fields. Historians, in addition, employ significantly more negational citations than the other H&SS researchers. This means that, for different H&SS subject fields, the equal contribution and positive endorsement assumptions have different levels of influence on the quality of citation counts. Plain citation counts will likely inflate the contribution of the cited works more in history and economics than in other fields.

The article-level analyses presented another picture of citation behavior among H&SS fields. The humanities and social sciences as two groups were not significantly different in authors' general negational behavior and in essential negation, but were significantly different in perfunctory negation. Humanities subjects were significantly different in all three types of negational behavior, while the social sciences subjects were different in general negation and essential negation. These findings show the very different argumentation styles in those subject disciplines. How the diverse citation behaviors influence the validity of citation analyses in indicating research contribution and impact awaits more theoretical and empirical investigation.

Returning to the issues of the equal contribution and positive endorsement assumptions that challenge the validity of citation count for all subject disciplines, this study along with the previous research suggest that the former might be a more serious problem for bibliometrics research and citation-based research evaluation. Theoretically, a prior work negated by the subsequent research can still be viewed as a form of contribution to knowledge advancement. Some negated works can even be the cornerstone of the works that follow. However, perfunctory citations, by definition, are minor to the generation and formation of new ideas and knowledge. Most of the empirical investigations (Chubin and Moitra 1975; Kim 2004; Krampen et al. 2002; Krampen et al. 2007; Murugesan and Moravcsik 1978; Stremersch et al. 2015), along with the current study, have all observed

relatively larger proportions of perfunctory citations in sciences, social sciences, and humanities subjects. The inflation it may cause to the assessment of research contribution and impact is worthy of concern. In fact, the higher percentages of perfunctory citations found in the previous studies focusing on sciences (Chubin and Moitra 1975; Murugesan and Moravcsik 1978) should alert science communities that, even for STEM disciplines, citation-based impact measures should be viewed and applied with extreme caution.

Using citation-based measures to assess research impact is a pursuit for objective and fair research evaluation. As this usage got popular and globalized in the past decades, we need to remember that citation behavior and citation usages vary in different academic and geographic contexts. One implication from this study is that existing literatures do not convey enough information on the characteristics and functionalities of citations for different subject disciplines and for cross-region research communities. Existing studies on science disciplines are rare and dated (Chubin and Moitra 1975; Murugesan and Moravcsik 1978). Other studies employed different analytic frameworks and different sources of data, and rarely did existing research adopt inter-coder consistency testing in their research designs to ensure the objectivity of observations. These factors make it difficult to draw a holistic and systematic comparison of citation characteristics and citation functions across subject disciplines and across geographic regions.

A contribution of this study is the coding scheme and coding procedures that can respond to the cross-comparison problems. The two-dimensional matrix of citation functions is a reconceptualization of previous theorizing of citation usage (Chubin and Moitra 1975; Moravcsik and Murugesan 1975; Murugesan and Moravcsik 1978). It is fully capable of incorporating subject-neutral and language-neutral observations, and it highlights the two important aspects of citation usage that inherently relate to citation count as a valid and effective impact indicator.

This study only examined six H&SS disciplines and the data sources are limited to Taiwan journals. As such, it might not be appropriate to generalize the findings of this study to other H&SS disciplines as well as the H&SS research outside of Taiwan. But the demonstration of the analysis provides a starting point for possible forthcoming comparisons. Future research sharing the same concerns on the problems and validity issues of citations may consider replicating and expanding the analytic framework of this research and continue to examine what citations do for different disciplines' academic research in different parts of the world. Such investigations may shed light on our understanding of scholarly citations and improve how we develop and enhance citation measures and techniques for better and more reliable research evaluation.

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