

# The Big Picture: Gaining Perspective by Examining Patterns in the (Tele)Presence Literature

Matthew Lombard, Matthew T. Jones  
 Temple University  
 lombard@temple.edu, matjones@temple.edu

## Abstract

*This paper reports initial findings from an analysis of 1,098 scholarly works identified as constituting the literature on (tele)presence. The value and implications of such a macro-level analysis and future research possibilities are discussed.*

## 1. Introduction

In some important ways, the work we all do related to (tele)presence<sup>1</sup> is akin to the work of a team of builders constructing a building. Both involve large, diverse groups of people using a variety of materials, specialized tools, and expertise across many areas to create something they hope will be of lasting value. And to be successful, both endeavors require those involved to have a vision of, and to monitor, not just their immediate or micro-level activities and goals but the longer term or macro-level ones as well – i.e., the big picture.

In this paper we explain why it's important to examine the scope, evolutionary trends and demographic patterns in the (tele)presence literature, and describe and report initial findings from such an examination.

## 2. Reasons to examine the Big Picture of (tele)presence scholarship

There are (at least) four important reasons to examine (tele)presence scholarship from a macro level:.

### 2.1. Efficiency

Just as builders need to understand and coordinate their diverse activities (e.g., foundation building, plumbing, electrical, masonry, roofing, cabinetry, painting, etc.) to complete the project as quickly and efficiently as possible, scholars working on a diverse set of questions and problems can accomplish their collective goal – building knowledge about a set of related phenomena – more efficiently if they understand the larger context of their work. We need to know what concepts, terms and definitions others are using; what micro-level problems and phenomena they're

<sup>1</sup> This term is used here because of the continuing confusion regarding the distinction between presence and telepresence; (tele)presence refers to either or both of these concepts.

studying; and where to find reports of work that relates to our specific areas. While we each conduct literature reviews for our focused topic areas, without this macro perspective, we're likely to slave away in our offices and laboratories inventing and reinventing individualized and needlessly redundant theories, terminology and tools that slow our progress toward a comprehensive understanding of (tele)presence.

### 2.2. Identifying gaps and plotting new directions

Although efficiency is an important benefit of gaining perspective on a literature, it should not (and need not) come at the expense of creativity. The macro perspective can reveal new directions for research and theory related to (tele)presence.

Overall, examining patterns in the literature of any field can help identify gaps in that work, questions that still need to be examined, applications that should be considered, etc. Managers who oversee the building of physical structures similarly use checklists and closely examine the plans and progress across all aspects of the project to avoid overlooking important elements in the building process. In the case of scholarly knowledge building, a broader perspective on the literature provides a larger collection of the data (questions, findings, etc.) of individual studies to inductively develop new questions and avenues for exploration.

### 2.3. Tracking the evolution and current health of the field

The macro perspective on a literature, especially a new, interdisciplinary and rapidly changing literature such as ours, allows scholars to better understand the collective history of work in the field as well as the current health (or lack thereof) of the academic area. While building with bricks and mortar generally takes less time and is less abstract than building knowledge, both require regular review and assessment to insure that the structure being built is sound. And both require specific and objective measures of progress to satisfy stakeholders (in the academic context these are university administrators and granting agency officers). Presence scholars, especially those outside Europe, look forward to the day when a (tele)presence study is viewed as part of a valid and recognized tradition just as a study in psychology or biology.

### 2.4. Interest value and uncertainty reduction

Finally, gaining a ‘big picture’ view of a literature and field is inherently interesting (just as watching a building being constructed is to many people; see, e.g., [1]). Aside from learning about others in one’s community of scholars and the work that they’ve done, it should be satisfying to reduce our sense of uncertainty (and thus perhaps anxiety) about the outlines, merit and constituency of one’s academic area.

### 3. Attributes to observe in a macro-level analysis of the (tele)presence literature

The following sets of attributes provide a basis for a macro level analysis that would fulfill the goals described in the previous section.

#### 3.1. Locations of works

Because (tele)presence phenomena occur in diverse contexts, relevant scholarship is conducted across several disciplines and is likely to appear in a diverse set of journals, books and database indices. Examining which and how many journals, databases, and other sources contain the (tele)presence literature provides a gauge of the level of dispersion and impact of (tele)presence concepts across academic disciplines and, conversely, information about which disciplines have had an impact on the study of (tele)presence.

#### 3.2. Demographic and other characteristics of works

Patterns in basic reference information across (tele)presence publications should provide valuable perspective. Changes in the numbers of publications across time demonstrates the rate of growth of (tele)presence scholarship. The relative proportions of journal articles, books, book chapters, dissertations, etc. (and changes in these proportions over time) provide insight into how knowledge is being built and synthesized in the field, including the level of ‘maturity’ of the field. The use of “presence,” “telepresence,” and related terms (and changes in these over time) suggest the degree of centrality of the concept(s) as well as which terminology is favored. In addition, the proportions of works that report data-based research findings; synthesis, review and theory building; and descriptions of evolving technology provide further insights regarding maturity and epistemology in the field.

#### 3.3. Characteristics of authors of works

The gender and national/geographic and institutional affiliations of the authors of (tele)presence publications tell us a lot about our community. The number of authors of the publications also provides insight into the amount of collaborative work in the field.

## 4. Research Question and Method

Based on the above discussion, we conducted a study to address this general research question: What are the salient macro level attributes of the literature on (tele)presence? This involved identifying the literature, collecting the works within it, and coding specific variables.

### 4.1. Identifying the (tele)presence literature

The first step toward obtaining a macro perspective on the (tele)presence literature of course is to identify the literature. We have identified the (tele)presence literature (as of February 2005) and report the details elsewhere [2]; the complete list of references is available from the authors (and will be available online soon). The identified works are 1,098 academic or scholarly articles, books, etc. that are generally available to researchers (e.g., via libraries, full text databases, etc.) Thus, dissertations are included but conference papers (unless they appear in generally available proceedings), unpublished master’s theses, and specialized or technical reports are not. The works are drawn from the following sources:

1. IJsselsteijn, Lombard, and Freeman’s 2001 article, “Toward a core bibliography of Presence” [3].
2. Searches in the citation databases ComAbstracts (Communication), Computer Abstracts, PsychInfo and ISI Web of Science for these keywords:

telepresence, tele-presence, (tele)presence  
 spatial presence  
 social presence  
 parasocial  
 computers are social actors  
 copresence, co-presence  
 subjective presence  
 virtual presence  
 sense of presence  
 perceived realism  
 perceived reality  
 perceptual realism  
 social realism

(Other popular (tele)presence-related terms such as “immersion,” “being there,” and, in fact, the term “presence” itself were omitted for the primary reason that they are in such general use that it would be impossible to use them in a keyword search and have any hope of sifting out irrelevant citations.)

and

3. The journal *Presence: Teleoperators and Virtual Environments*, its online, blind peer-reviewed supplement *Presence-Connect*, and the journal *Cyberpsychology & Behavior*; works containing the key words above and/or

the term “presence” used in its scholarly context are included.

A complete list of the 1,098 identified works is available at [http://ispr.info/p-lit\\_index.htm](http://ispr.info/p-lit_index.htm)

### 4.2. Collecting works in the literature

We have begun compiling electronic and printed copies of all 1,098 works in the literature. Many of the works are available at no cost online while others present economic or other challenges (e.g., the length and bulk of books and dissertations). To date we have acquired and printed copies of 286 of the identified works; we will obtain most of the others by the PRESENCE 2005 conference.

### 4.3. Coding variables

Using an Excel spreadsheet, we coded the following variables for each work in the literature: the database(s) and/or other source(s) that listed or contained the work; the full name of journals and proceedings in which works appeared; the year of publication; the format (article, book, book chapter, dissertation, proceedings); the appearance of any variant of the term “presence” in the title; whether the work presented data-based research findings (i.e., contained “method” and “results” headings and presented quantitative and/or qualitative findings), synthesis and theory building, or descriptions of technology; and the gender, institutional and national/geographic affiliation of the author (in cases of multiple authors we recorded this information for the first author and recorded the number of authors and whether their institutional affiliations were different or not).

While it would be valuable to examine additional variables as well, these most fundamental aspects of the literature should be considered first and will likely suggest additional variables for future analyses.

## 5. Results

### 5.1. Locations of works

Over half (55.6%, n=611) of the works in the (tele)presence literature appear in the ISI Web of Science database and over 4 in 10 (41.6%, n=457) can be found in PsychInfo, with smaller but substantial numbers of the works in the other databases and sources (see Table 1). Nearly three quarters (72.7%, n=797) of the works appear in only one of the eight sources, with another 16.5% (n=181) appearing in two of them (see Table 2).

Table 1. Sources in which (tele)presence works are found.

Source	Number of works	Percent of works
IJsselsteijn, Lombard, and Freeman (2001) [3]	95	8.6
ComAbstracts (Communication)	73	6.6
Computer Abstracts	124	11.3
PsychInfo	457	41.6
ISI Web of Science	611	55.6
<i>Presence: Teleoperators and Virtual Environments</i>	105	9.6
<i>Presence-Connect</i>	9	0.8
<i>Cyberpsychology &amp; Behavior</i>	54	4.9

Table 2. Number of sources in which (tele)presence works can be found.

Number of sources	Number of works	Percent of works
1	797	72.7
2	181	16.5
3	107	9.8
4	12	1.1
5	0	0.0
6	0	0.0
7	0	0.0
8	0	0.0
Total	1098	100.0

Of the 930 (84.7%) of the works that appear in journals or proceedings, the greatest number (105) appear, not surprisingly, in the MIT Press journal *Presence: Teleoperators and Virtual Environments*; an additional 54 appear in *Cyberpsychology & Behavior* and 8 other journals contain 11 or more of the works (see Table 3). The works appear in 442 different journals (427) and proceedings (15), and 312 (33.58%) of these venues contain only one of the works (see Table 4). The journals come from diverse disciplines including art, business, communication, computer science, education, engineering, linguistics, medicine, music, nutrition, oceanography, philosophy, physics, psychology, religion, social work, sociology, and more.

Table 3. Journals and proceedings that contain the most (tele)presence works (total n=930).

Journal	Number of works
<i>Presence: Teleoperators and Virtual Environments</i>	105
<i>Cyberpsychology &amp; Behavior</i>	54
<i>Communication Research</i>	14
<i>BT Technology Journal</i>	13
<i>Human Communication Research</i>	13
<i>IEEE Transactions on Circuits and Systems for Video Technology</i>	12
<i>International Journal of Human-Computer Studies</i>	12
<i>Psychological Reports</i>	12
<i>Journal of Broadcasting and Electronic Media</i>	11
<i>Journal of Communication</i>	11

Table 4. Number of journals and proceedings that contain different numbers of works in the (tele)presence literature.

Number of works in journal	Number of journals	Percent of journals
105	1	11.30
54	1	5.81
14	1	1.51
13	2	2.80
12	3	3.88
11	2	2.37
10	0	0.0
9	3	2.91
8	2	1.72
7	1	0.75
6	3	1.94
5	5	2.69
4	15	6.46
3	26	8.40
2	35	13.99
1	312	33.58
<b>Total</b>	<b>930</b>	<b>100.0</b>

### 5.2. Demographic and other characteristics of works

The earliest publication in the literature is from 1937, Mauge's book *La destinée et le problème du vrai : L'esprit et le réel perçu*. [Destiny and the problem of truth. The mind and perceived reality] (published by Alcon). A clear growth trend can be seen in the number of publications in the subsequent years (see Figure 1). Three quarters (78.1%, n=858) of the works were published in the decade between 1995 and 2004.

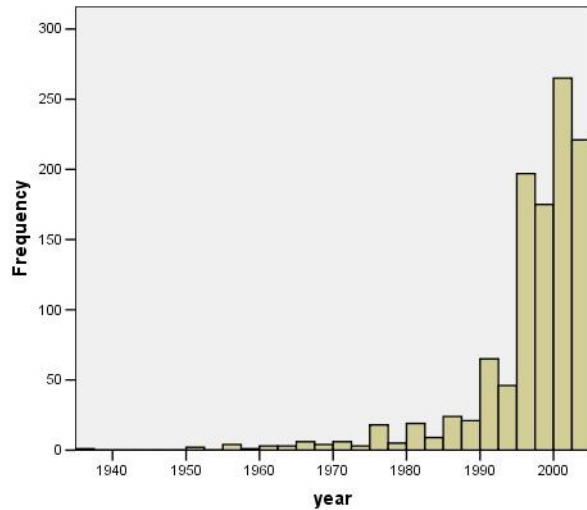


Figure 1. Publications per year.

Over 80 percent (n=911) of the works are articles, with smaller numbers of dissertations, book chapters, books and papers from proceedings (see Table 5).

Table 5. Formats of works in the (tele)presence literature.

Number of sources	Number	Percent
Articles	911	82.9
Proceedings	21	1.9
Books	44	4.0
Book chapters	49	4.5
Dissertations	72	6.6
Other	1	0.1
<b>Total</b>	<b>1098</b>	<b>100.0</b>

“Presence” and/or variants of that term appear in the titles of 314 (28.6%) of the works, with “telepresence” the most common variant (see Table 6).

Table 6. Frequency of “ Presence” terms in titles of works.

Terminology	Number	Percent
Presence	149	13.6
Telepresence	120	10.9
Social presence	34	3.1
Copresence	11	1.0
Virtual presence	5	0.5
Immersive presence	1	0.1
Perceived presence	1	0.1
Spatial presence	1	0.1
Subjective presence	1	0.1

As of this writing we’ve acquired and compiled printed copies of 286 or 26% of the 1,098 works in the literature and coded 77 of these regarding the nature of the work [All of the works will be acquired and coded before PRESENCE 2005.]. Nearly 6 in 10 (58.4%, n=45) are reports of data-based research findings, another 3 in 10 (28.6%, n=22) are focused on review, synthesis and theory-building, and the rest (7.7%, n=10) are descriptions of technologies and their application.)

**5.3. Characteristics of authors of works**

Among the initial sample that has been coded, male authors (67.5%, n=52) outnumber females (24.7%, n=19); the gender of a few authors (7.8%, n=6) cannot be determined from the work.

The (first) authors of the 77 coded works are, or at least were at the time the works were published, affiliated with 65 different institutions; Eindhoven (5), Michigan State (3) and Temple (3) universities are, so far, most represented in this small sample.

Eleven nations are represented in the institutional affiliations of the 77 coded works: England, France, Germany, Israel, Italy, Korea, The Netherlands, Scotland, Spain, Sweden and the U.S. The U.S. (45%, n=35) and England (14.3%, n=11) were the most frequent affiliations.

Of the 58 multi-authored works coded, the authors of 37 (63.8%) have different institutional affiliations, indicating substantial collaboration across geographical boundaries.

Nearly 4 in 10 (37.8%, n=415) of the entire collection of published works have only a single author; another 3 in 10 (26.9%, n=296) have two authors, and the remaining works have 3 or more authors (see Table 7).

Table 7. Number of authors of (tele)presence works.

Number of authors of work	Number of works	Percent of works
1	415	37.8
2	296	26.9
3	169	15.4
4	106	9.6
5	41	3.7
6	25	2.3
7+	42	3.8
No author identified	4	0.4
Total	1098	100.0

**6. Discussion**

These results provide an initial macro-level view of the (tele)presence literature and field. So what do we see from this vantage point?

The fact that three quarters of the works in the (tele) presence literature can be found in only one of eight key research databases and other sources and no source contains more than 56% of the works, suggests opportunities to increase the efficiency with which we explore (tele)presence concepts and phenomena. If and when a central database becomes available for our field – PresenceInfo? – it would likely facilitate the exploration of all of these sources in conjunction with one another. In turn, this would allow us to move ahead more productively and efficiently because we’d find within and among them unexpectedly relevant theories, findings, and descriptions of evolving technology.

The big picture perspective demonstrates that the (tele)presence field is young, highly interdisciplinary, and growing. While the oldest publication in the literature is from 1937, three-quarters of the works are from the last 10 years. Despite the fact that *Presence: Teleoperators and Virtual Environments* and *Cyberpsychology & Behavior* are the predominant fora, (tele)presence works appear in a startlingly large number of journals and proceedings across dozens of disciplines and subdisciplines. The number of publications in the field, including articles, books, book chapters and dissertations, is increasing rapidly. The literature contains about twice as many data-based research reports as works in which the focus is on synthesis, and a smaller number of works that describe developing technologies. People can reasonably differ regarding what the appropriate balance of these is, but clearly all are valuable and required in a healthy discipline.

On the other hand, the terms “presence” and “telepresence” appear in the title of less than 30% of the works and it’s not clear that they’re being used to represent distinct concepts; in addition, the use of the word presence, because of its other common usages, represents a challenge to scholars searching for relevant literature.

Hopefully, compiling and analyzing this and other macro level information about (tele)presence scholarship will help us learn more (and reduce our uncertainty) about the “presence” community and the work of all of its members.

### 6.1. Future research

The big picture view should be updated regularly in order to monitor the evolution of (tele)presence scholarship, including changes in its dispersion across disciplines, databases, venues, and formats, as well as demographic trends among its members. Tracking changes in the percentage of works that include different key conceptual labels (primarily “presence” and “telepresence”) should provide a good indicator of the centrality of (tele)presence in the literature, and thus one aspect of the field’s maturation.

Comparative data from other fields (especially regarding collaboration, format and focus of works) would provide additional useful perspective on the (tele)presence literature and field.

Many more detailed analyses of the literature, e.g., of the conceptual and operational definitions of (tele)presence, and the specific topics and conclusions within the works, would help identify gaps in the literature and suggest new research questions to pursue.

An example of a tool that could be useful in the analyses is RefViz, available from Thomson™. RefViz literature visualization software permits the user to obtain “at-a-glance” summaries of major themes as well as conceptual relationships and correlations between concepts in a set of works. Certain practical obstacles (such as the lack of database abstracts in some of the literature sources) would need to be overcome to use this tool, but the results are likely to lead to many of the benefits described at the beginning of this paper.

Just as builders of a physical building must have a macro level view of their work and their progress toward their goals, so must builders of knowledge. This project provides this kind of big picture perspective for builders of knowledge regarding what we consider the important and fascinating topic of (tele)presence.

### References

- [1] Kimmel Center, Inc. Building the Center: Time-Lapse Construction Video. Retrieved June 8, 2005 from <http://www.kimmelcenter.org/building/timelapse.php>
- [2] Lombard, M. & Jones, M. T. (2005). Identifying the (Tele)Presence Literature. *Cyberpsychology & Behavior* (submitted).
- [3] IJsselsteijn, W. A., Lombard, M., & Freeman, J. (2001). Toward a core bibliography of presence. *Cyberpsychology & Behavior*, 4(2), 317-321.