

User Survey of Living Reviews in Relativity (September 2008 - February 2009)

Vera Osswald
vosswald@aei.mpg.de

April 6, 2009

Abstract

Shown are the results of an online user survey of *Living Reviews in Relativity* which was conducted from September 2008 to February 2009. The survey aimed to find out where readers come from, their professional background and their reading and download habits. The analysis is based on 80 completed questionnaires, 60 by readers with a scientific background, and 20 by non-scientists. The largest group of readers who took part in the survey came from Europe, the second largest from the United States, and third one from India. A very satisfactory result is that more than half visit *Living Reviews in Relativity* at least once a month.

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1 Introduction

From September 2008 to February 2009 *Living Reviews in Relativity* conducted a survey among its readers. After ten years of publication we felt this was a good occasion to ask readers for comments, find out how they use the journal, and whether they have wishes for future article topics and suggestions for the improvement of the journal in general.

Without previous experience of what return to expect we decided to keep the survey short assuming that this would result in a better response rate. It consisted of only 12 questions, which covered the following three areas:

- Information about the user (place of residence and educational/professional background),
- How often they visit the journal, and how they use it,
- Their main interests and suggestions.

For the complete survey form see Appendix [A](#).

2 General Remarks

Before looking at the results of the survey, a few words need to be said about the sampling and analysis.

2.1 Sampling

We do not know the exact number of our readers, where they reside or what their professional background is. While Robert Forkel has tweaked the access log statistics “to provide a more correct account of requests initiated by actual people, rather than search engines, or automated download agents”, he also notes, “this aim will never be attained completely as crawlers, spiders and robots abound and come in disguise.” The subscription mailing list with its current 630 members gives some indications where people come from, but this need not be representative of our overall readership.

Therefore our sampling method could only be nonprobability sampling, i.e. we could not calculate the probability of getting a particular sample of the journal’s readership. What we can say is that 70% of those that did participate in the survey are subscribed to the mailing list, which at least allows a cautious comparison of the countries of residence survey participants named with email addresses of subscribers.

The results of this analysis can only say something reliable about the readers who actually chose to respond to the survey. Participation might have been influenced by a number of things, like time available, age, motivation etc. and those that answered the questions might not be a good representation of the broader readership.

2.2 Analysis

The analysis is based on 80 completed questionnaires, 60 by readers with a scientific background, and 20 by non-scientists.

To identify user group specific characteristics, habits and wishes it seemed appropriate in some cases to distinguish between three groups, physicists, other scientists, and non-scientists.

Three of the questions were open-ended ones. For the “topics wished for” and the “suggestions for improvement” some ordering was attempted, but the answers are simply given as lists. The question “What is your primary field of study/research?” turned out to be problematic for non-scientists, because for them it was not clear whether we wanted to know their field of interest with regard to the journal or their professional background.

3 Demographic Data

3.1 Location

The largest group of readers who took part in the survey came from Europe, the second largest from the United States, and third one from India. This is true as much for the scientists as the non-scientists. For comparison we also show the distribution of the 630 mailing list subscribers (as of March 10, 2009).

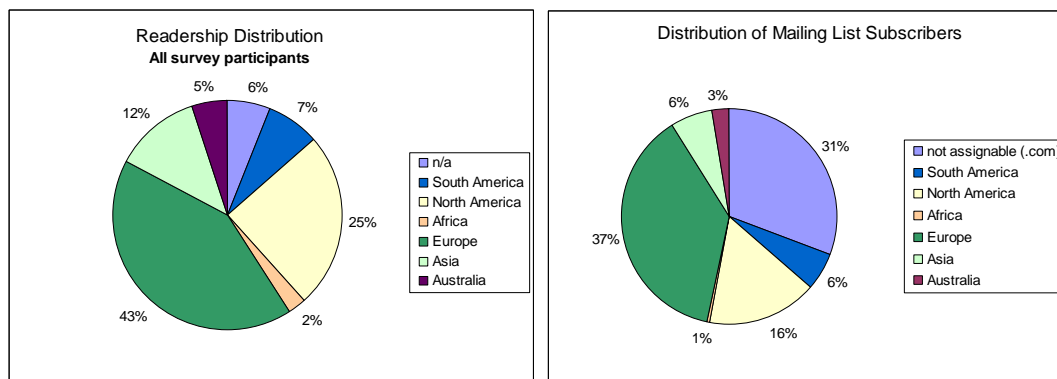


Figure 1: Where readers who responded to the survey and mailing list subscribers come from.

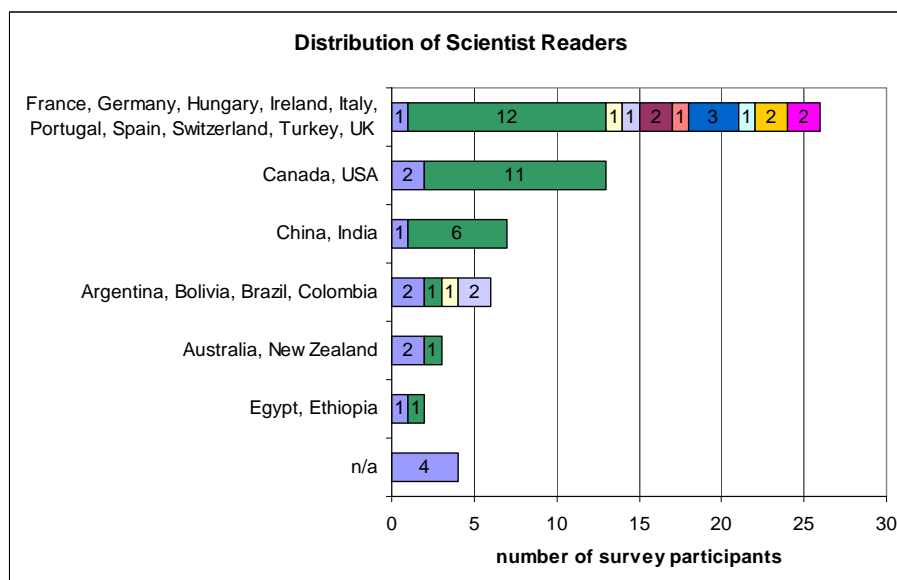


Figure 2: Where the scientists among the survey participants come from. (One of the readers gave two countries, Germany and Australia, which is why the total amounts to 61.)

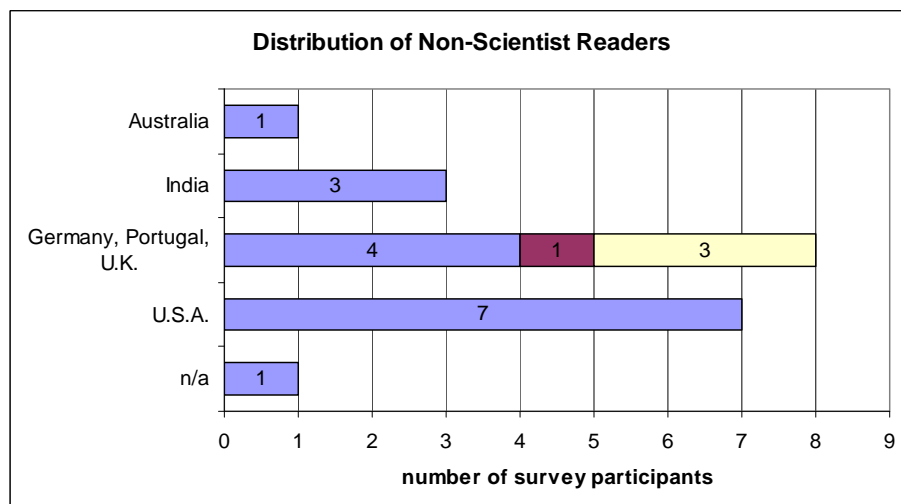


Figure 3: Where the non-scientist survey participants come from.

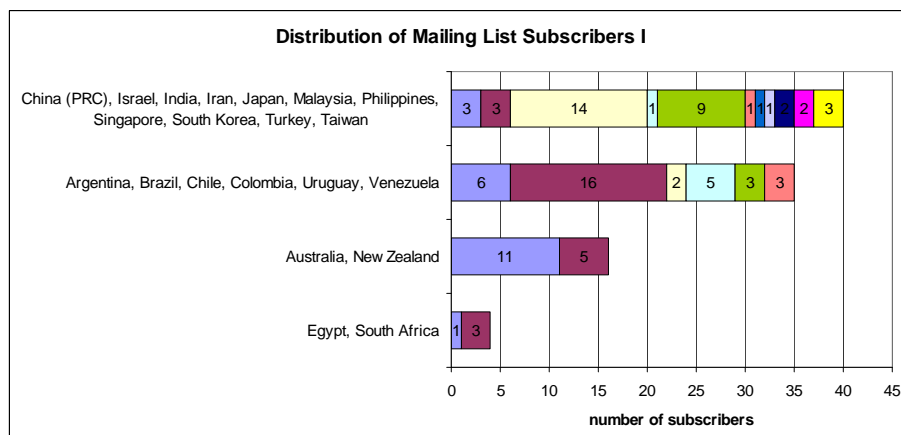


Figure 4: Where mailing list subscribers in Asia, South America, Australia and Africa come from.

One argument for Open Access is to serve scientists in countries where universities and other scientific institutions cannot afford to pay the high subscription fees for scientific journals. One cannot help noticing however, the under-representation of mailing list subscribers and survey participants from such countries, especially in Africa, but also some in Asia, South America and the Russian Federation. If *LRR* wants to broaden its readership and actively promote O.A. it might be worthwhile to think about the reasons for this under-representation:

- Maybe relativity and astrophysics are rarely part of the curriculum at the universities,
- in which case there won't be much research either and simply no target reader group.
- Or there is a significant number of potential readers, but they don't speak English,
- or don't have internet access,

- or mailing list subscription and survey participation is very unpopular,
- or they simply don't know about *Living Reviews in Relativity*.

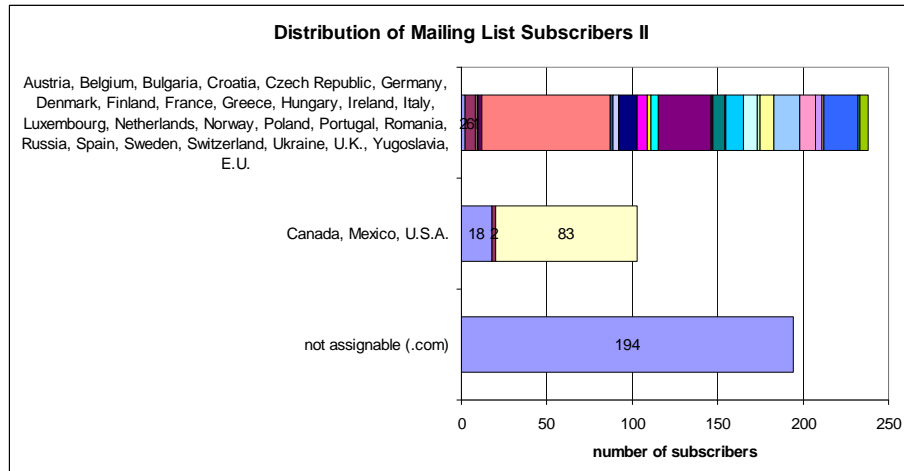


Figure 5: Where mailing list subscribers in Europe and North America come from, plus the number of people with .com addresses. (For better readability the numbers for the European countries are listed in Table 1.)

Table 1: Where mailing list subscribers in Europe come from. (Rather than split the numbers for Turkey and Russia between Asia and Europe, Turkey is listed in Asia, and all Russian addresses are listed in Europe. In Turkey, one address was from the Asian part and the other was not attributable. In Russia two addresses out of eight were from the Asian part.)

| Countries | Each With Subscribers |
|---|-----------------------|
| Bulgaria, Croatia, Luxembourg, Norway, Ukraine, Yugoslavia | 1 |
| Austria, Czech Republic, Denmark, Hungary, Romania | 2 |
| Finland | 3 |
| Ireland, Switzerland | 4 |
| E.U. | 5 |
| Belgium, Greece | 6 |
| Netherlands | 7 |
| Portugal, Russia | 8 |
| Sweden | 9 |
| Poland | 10 |
| France | 11 |
| Spain | 15 |
| U.K. | 20 |
| Italy | 31 |
| Germany | 75 |

3.2 Educational attainment and fields of study/research

The distinction between physicists, other scientists and non-scientists was made based on the answers to questions 1 and 2 in Appendix A.

- student/postdoc AND physics = physicist
- student/postdoc AND other primary field = other scientist
- non-scientist OR no answer = non-scientist, irrespective of the given primary field

Table 2: All physicists but one replied to this question. Some gave more than one primary field. So mathematics or philosophy were not the first items here, but listed *after* something distinctly physics.

| Primary Field of Research of Physicists | Number of occurrences |
|--|-----------------------|
| Astroparticle Physics | 4 |
| Astrophysics | 5 |
| Black Holes | 3 |
| Black Hole Thermodynamics | 1 |
| Classical General Relativity | 1 |
| Compact Objects | 1 |
| Cosmology | 9 |
| Cosmology and Structure Formation | 1 |
| Extensions of Relativity | 1 |
| Fundamental Physics in Space | 1 |
| Gamma-ray Bursts | 1 |
| General Relativity | 6 |
| Gravitation | 1 |
| Gravitation and Cosmology | 1 |
| Gravitation Field Theory | 1 |
| Gravitational Collapse | 1 |
| Gravitational Experiment | 1 |
| Gravitational Wave Astronomy | 2 |
| Gravitational Waves | 2 |
| High Energy Astrophysics | 2 |
| History and Philosophy of Sciences | 1 |
| Mathematical aspects - General Relativity | 1 |
| Mathematics | 1 |
| Microwave Cosmic Background Radiation - General Relativity | 1 |
| Modified Gravity | 1 |
| Monopoles Magnetic | 1 |
| Neutron Stars | 2 |
| Numerical Relativity | 2 |
| Numerics of wave maps and linearized Einstein equations | 1 |
| Particle Physics | 1 |
| Philosophy | 2 |
| Plasma Confinement | 1 |
| Plasma Physics | 1 |
| Problem of Time | 1 |
| Quantum electrodynamics | 1 |
| Quantum Field Theory | 2 |
| Radiative Processes in Astrophysics | 1 |
| Relativistic Astrophysics | 2 |
| Relativity | 2 |
| Relativity in Test | 1 |
| Simulations with RPIC and GRMHD | 1 |
| Spacecraft (at JPL) | 1 |
| Special and General Relativity | 1 |
| Theoretical Physics | 1 |
| Theory of Relativity | 1 |
| n/a | 1 |

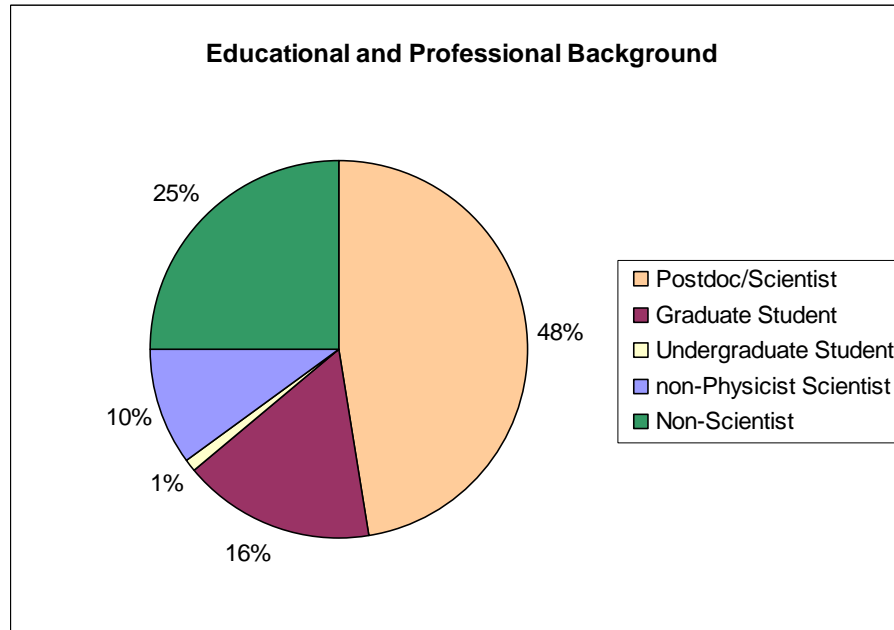


Figure 6: The largest group of the readers identifies as “Postdoc/Scientist” (including all non-physicist scientists). Of those readers still at university only one identified as undergraduate student.

Table 3: All of the other scientists but one replied to this question. One named the combination of mathematics and computer science.

| Primary Field of Research of Other Scientists | Number of occurrences |
|---|-----------------------|
| Computer Science | 3 |
| Mathematics | 2 |
| Differential Geometry | 1 |
| Biology | 1 |
| Ozone in the stratosphere | 1 |
| n/a | 1 |

Table 4: The non-scientist readers mostly answered the question by giving their primary field of interest, but a few gave information on their professional background.

| Primary Field of Research of Non-Scientists | Number of occurrences |
|---|-----------------------|
| Publishing | 1 |
| Science author and journalist | 1 |
| Computer science, Independent researcher (he/she checked non-scientist) | 1 |
| Cognitive Thermodynamics, theory of cognition-culture-religion | 1 |
| Alternate theories of gravity | 2 |
| Astronomy | 1 |
| Astrophysics | 5 |
| Classical Mechanics | 1 |
| Cosmology | 4 |
| Exchange of energy | 1 |
| Force between structured mass and un-structured velocity | 1 |
| General Relativity | 3 |
| Gravity | 2 |
| Gravitational Waves | 1 |
| History of Physics | 2 |
| Loop Quantum Gravity | 1 |
| Math | 2 |
| Particle Physics | 1 |
| physics | 1 |
| Quantum Mechanics | 2 |
| Quantum Statistics | 1 |
| Space flight | 1 |
| Special Theory of Relativity | 2 |
| String Theory | 1 |
| Thermodynamics | 2 |
| Unification | 1 |
| n/a | 2 |

4 Journal Usage

4.1 Reading habits

The majority of the survey participants downloads the PDF version of the article for reading. None of the participants downloaded the gzipped HTML version.¹

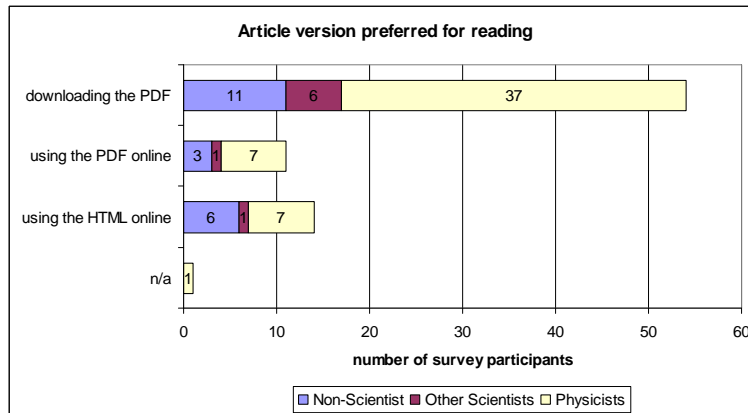


Figure 7: The article version preferred for reading.

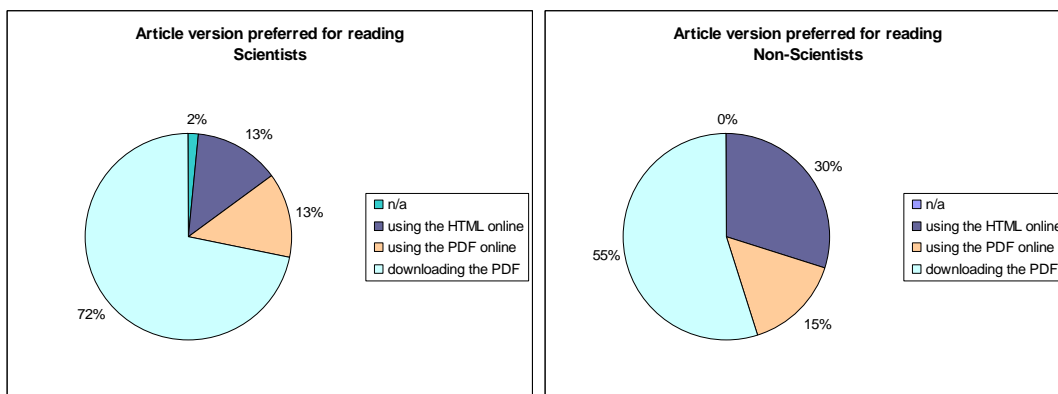


Figure 8: The HTML version of the article is more popular with the non-scientist readership.

4.2 Download of references and use of the reference database

45% of the users answered that they use the reference database, but 64% claimed they download references. Given that there is a download link for references on the download page users might be more aware of the option to download the BibTeX file than they are of the search option for the reference database. However, the ratio of *users downloading references* : *users downloading article PDF* seems highly unlikely for the general readership.

¹In a previous user survey conducted in February 2007 we asked whether users are downloading articles in the gzipped HTML and received 10 “yes” answers (see <https://dev.livingreviews.org/projects/livingreviews/wiki/UserSurvey>).

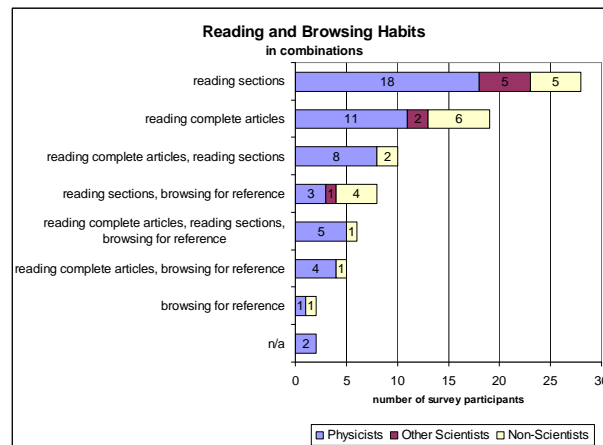


Figure 9: The distribution of the combinations of reading and browsing habits.

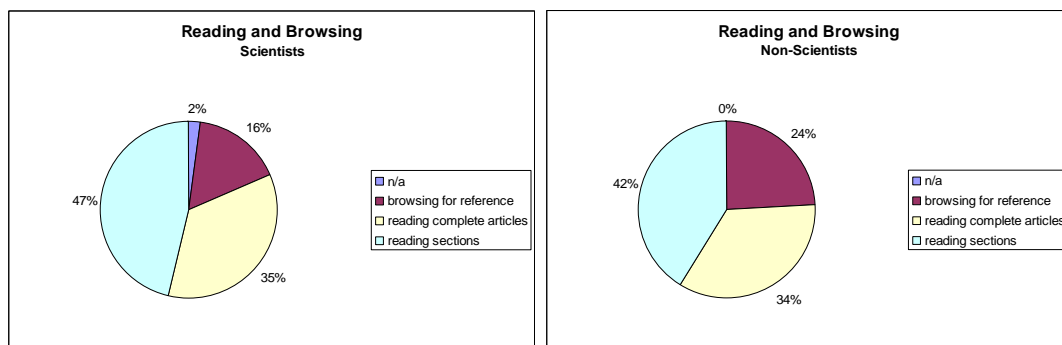


Figure 10: The reading and browsing habits are very similar for scientists and non-scientists, with the former reading slightly more selectively and the latter browsing for references more often.

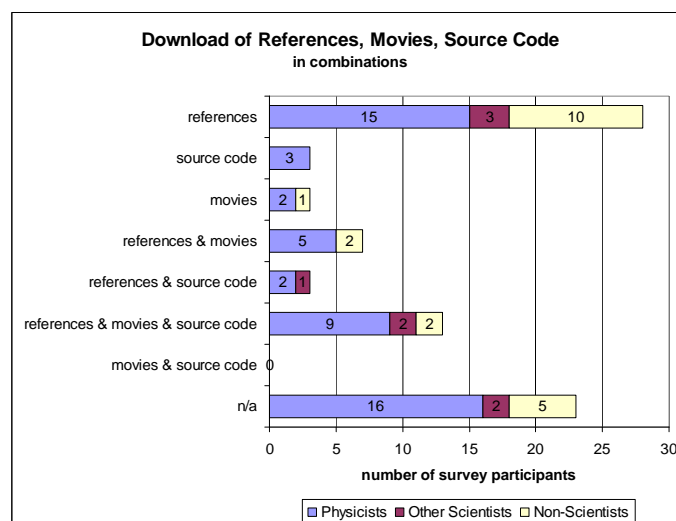


Figure 11: The distribution of the combinations of downloading references, movies and source code.

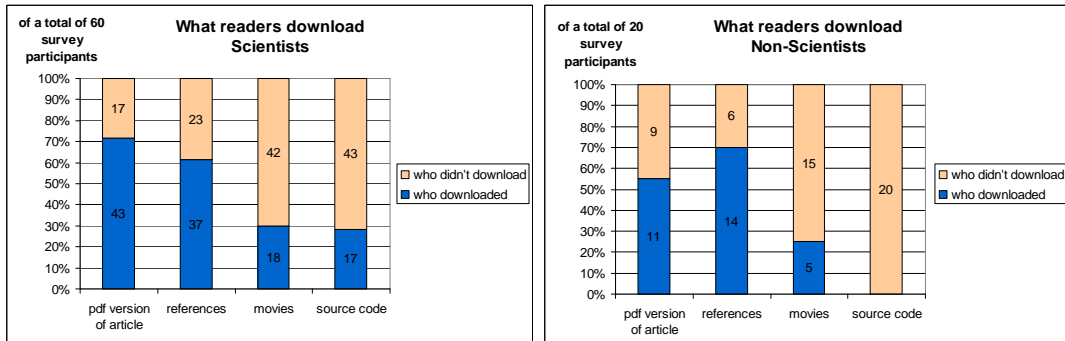


Figure 12: Of those who did download additional material the non-scientists made proportionally more use of the references, but for both groups this number seems quite high.

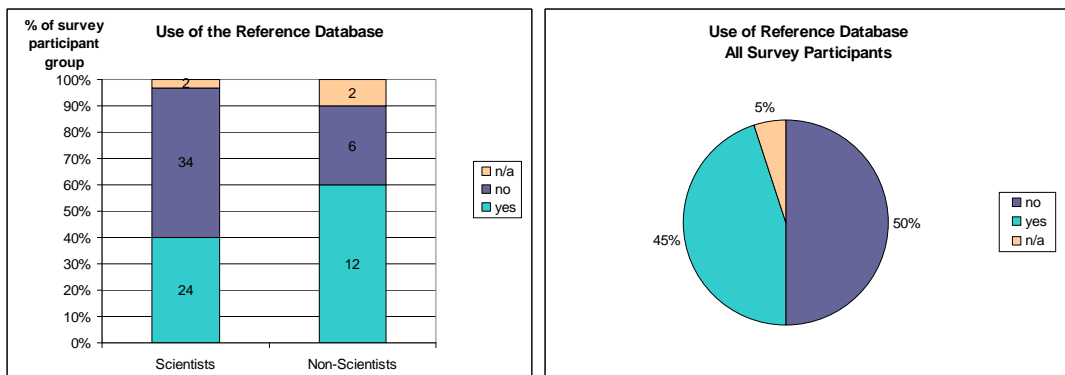


Figure 13: We also asked explicitly whether readers use the reference database and 45% answered in the affirmative.

During the first three weeks in March 2.815 article PDF files were downloaded. In the same period 166 BibTeX files of articles were downloaded. This is already an unusually high number of reference downloads, but far from reflecting the proportions in Figure 12.²

The web statistics cover only two aspects of the usage of the references: searches of the reference database and download of the complete BibTeX files of articles. Users however, might have thought of their copy and paste of references, export of search results, or even a simple tracking of references within an article, when they answered that they download references and use the reference database.³

4.3 Frequency of journal visits and subscription methods

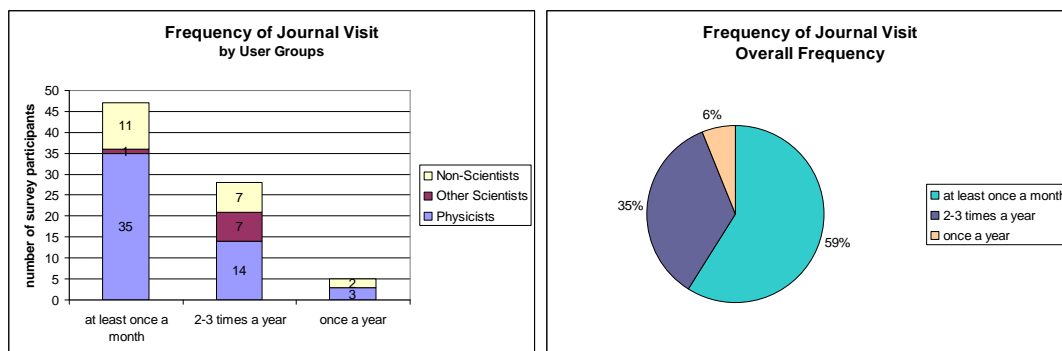


Figure 14: Frequency of visits to the journal website. This was a positive surprise, but it might well be that so far only readers responded to the survey, who visit on a more regular basis anyway.

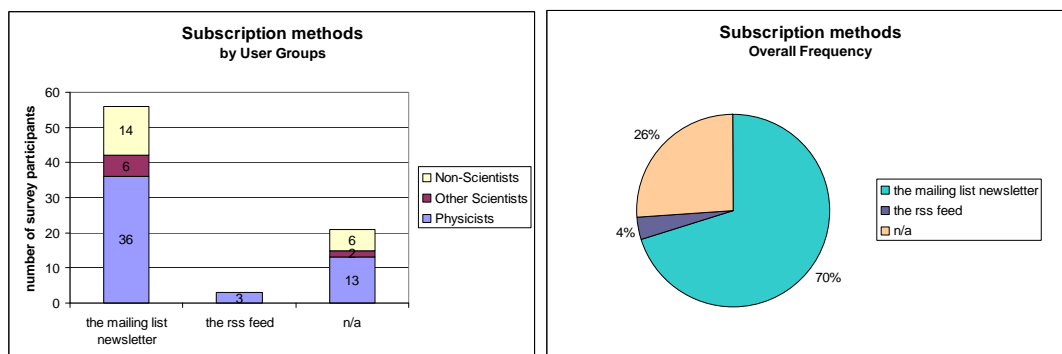


Figure 15: Subscription methods to news and updates. Only three survey participants make use of the RSS feed (all three physicists).

²The monthly average for the download of BibTeX files is 73 (September 2004 – March 21, 2009).

³The total number of refDB searches is just 5.620 for the period May 4, 2005 – March 21, 2009 (with no data for server down times).

5 Interests and Suggestions

5.1 Main interests

Participants could choose multiple subject fields as their main interests. The frequency of occurrence (%) of each subject field is given separately for the three user groups.

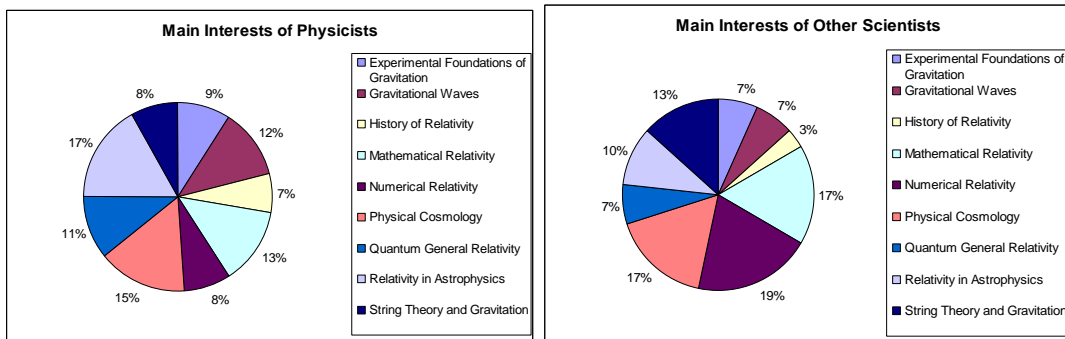


Figure 16: The interests of “other scientists” reflect that 5 out of 8 named computer science and/or mathematics as their primary field of research.

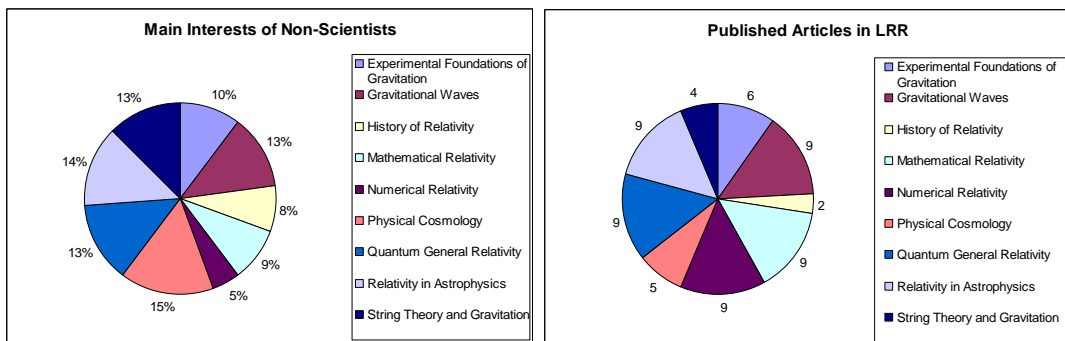


Figure 17: The main interests of non-scientists are similar to those of physicists. For comparison we show the number of topics published so far in *Living Reviews in Relativity* (not counting updates).

Of course, the number of articles published is in itself no indication of how well a subject field is covered. But the low number of published articles in the area of physical cosmology stands in contrast to the broadness of the field and the interest of the readers. Are the reviews in this field all being published in *Annual Reviews*? Do we want more reviews in this area and do we want to put in the effort to get them? Or are we satisfied with a lower publication rate in physical cosmology, because *LRR*’s strength lies in other areas. On a side note, out of 10 scientists who gave physical cosmology as their primary field of research, 9 also included it in their list of main interests.

Of the 60 scientists

- 18 chose three main interests,
- 12 chose four, and
- 10 chose one,

- 6 chose 2,
- 5 chose 5,
- 4 chose 6
- 5 chose seven or more subject fields.

| | EFG | GW | HR | MR | NR | PC | QGR | RA | ST |
|-----|------------|-----------|-----------|-----------|-----------|-----------|------------|-----------|-----------|
| EFG | | 10 | 9 | 8 | 6 | 10 | 7 | 10 | 8 |
| GW | 10 | | 5 | 7 | 12 | 10 | 5 | 17 | 5 |
| HR | 9 | 5 | | 8 | 4 | 7 | 6 | 8 | 6 |
| MR | 8 | 7 | 8 | | 7 | 14 | 14 | 13 | 11 |
| NR | 6 | 12 | 4 | 7 | | 7 | 4 | 12 | 4 |
| PC | 10 | 10 | 7 | 14 | 7 | | 15 | 19 | 12 |
| QGR | 7 | 5 | 6 | 14 | 4 | 15 | | 9 | 11 |
| RA | 10 | 17 | 8 | 13 | 12 | 19 | 9 | | 9 |
| ST | 8 | 5 | 6 | 11 | 4 | 12 | 11 | 9 | |

Numbers correspond to the occurrence of two subject fields being chosen together. Physicists who are interested in subject “A” are also interested in subject “B”.

5.2 Topics scientists would like to read about

Question: “Which topics would you like to read about?”

- I like the variety currently offered.
- Very general answers: Astrophysics, Cosmology and Astrophysics, Cosmology, Quantum Gravity (named 4x), String Theory, Numerical Relativity, Anything about relativistic astrophysics and cosmology including relativity theory, Especially on relativity and quantum mechanics, Everything related to Physics and Mathematics.
- Accretion Disks.
- Pulsars.
- Jets.
- Critical Evaluation of Cosmology.
- Cosmological distance scale (and its consequences for the uncertainty of cosmological parameters!) Axiomatic formulation of GR (Ehlers/Pirani and successors).
- Observational Cosmology.
- Statistical aspects of LSS and cosmology.
- Expansion of Universe.
- CMBR.
- Specially I expect one issue about “redshift controversy” with a full detailed explanation.
- Candidates for non-baryonic Dark Matter.

-
- Candidates for Dark Energy.
 - GRBs.
 - Modelling and fitting using observational data from galaxies gama-ray burst etc.
 - Limit on precision phase measurement.
 - Frame dragging.
 - I see that there is a lot of good stuff listed as upcoming, maybe also consider:- Effective field theory approach to Post-Newtonian calculations- Parameter estimation for gravitational wave observations.
 - Alternative gravitational theories Wormholes and Time Machines.
 - No Hair theorem and black holes in string theory.
 - Not too technical reviews of Ashtekar quantum gravity.
 - QFT.
 - Gravitation as effective field theory.
 - Stochastic Gravity.
 - Plank scale physics.
 - Fractal space-time.
 - Brane world models.
 - Introduction to CACTUS and LORENE Review and description how the modern binary black hole codes work.
 - Numerical codes for gravitational lensing and for phenomena in the inner parts of accretion disks and for the trajectories of light and particles emitted in the vicinity of a compact object.
 - Mergers of compact objects (especially the recoil due to the asymmetrical emission of gravitational radiation the spin of the merged object and what happens to the two accretion disks during the merger including their magnetic fields hence, plasma instabilities in strong gravitational fields).
 - I would like to see more about numerical methods, even if they are not directly applicable to relativity. Universities do generally not a good job teaching students about numerical methods, at least not those that students will use in their research projects. A set of living review articles that covers also the basic could be a prime reference for students. For example, I often refer students to Cook's LR article when they need to test a code with analytic solutions of the Einstein equations.
 - I am interested into foundations of physics, criticism and development of Relativity Theory and applications. Also I am consulting all papers, but I read and type only in which I am specialist. Very much are interesting for me the papers referring to history of science, with regard special to physics, mathematics, technologies.

5.3 Topics non-scientists would like to read about

Question: “Which topics would you like to read about?”

- Very general answers: “all of them”, Particle Physics (2x), Particle Astrophysics, Gravity (2x), Relativity.
- Detection of Gravitational Waves (2)
- Black holes (2x).
- Dark matter and Dark Energy.
- Modern Experimental techniques to verify General Theory of Relativity (2)
- Experimental verification of Special Theory of Relativity.
- Application of General Theory of Relativity in Cosmology etc.
- Geometries associated with quantum fields.
- Research concerning outer space numerical problems and solutions.
- Entropy of black holes, event horizon and quantum mechanic.
- An overview over all known exact solutions of Einstein’s field equation including technics and tricks for doing calculations.
- For understanding loop quantum mechanic a lot of knowledge on general relativity is need. An advanced “introduction” to general relativity would be very helpful, which provides the knowledge to start with quantum gravity (Thiemanns Introduction was very helpfull).
- Semi popular/popular article on alternative explanation of the effects of Dark Energy by Back-reaction in an inhomogeneous Universe.
- Semi popular/popular article on exposition of the contents of the *Relativistic Theory of Gravitation* by the Russian academician Prof. Anatoly A. LOGUNOV.

5.4 Comments and suggestions by scientists

Question: “Do you have comments or suggestions for improving Living Reviews?”

- No.
- Not really.
- Not at present.
- No! I think it is pretty good!
- No. Only, I want to thank you for your work!
- No, but I would like to thank you for this great service and the mostly excellent papers!
- Thanks for your great work.
- You are doing a great job.
- It’s already an invaluable journal.

- Keep going!
- Congratulations! I'm a master student and this journal has been made one important reference in my work, and hopefully in future research. Thanks.
- Bring out occasional light hearted reviews.
- More VIDEO!
- 1)More sections. 2)More multimedia material: pps slides, videos, etc. It would be nice if you add seminars or conference from your universities.
- As an extension, RPIC shock simulations may be included.
- The current format is the standard, peer-reviewed format. You could experiment with a wiki, where people could (and maybe indeed would) contribute smaller entities than articles on a more informal basis. With time, these small pieces could form the basis of a real article. This wiki would likely need a maintainer who exerts some kind of relaxed quality control.
- A different issue is that it would in many cases be very convenient to have simple source code with certain equations/algorithms introduced in LR articles. For example, Christian D. Ott is offering a nuclear equation of state at <http://stellarcollapse.org/>; this could – after peer review – also be offered at LR instead, accompanied by an article describing how the table was calculated.
- Only use the spires and mathematical reviews databases, if things turn up there I might search them out, are there links to mathematical reviews?
- I want to be awared, whenever any paper is updated.
- I get confused with the different sections where you post the articles. Is there a way to have one integrated view into all the publications as well as the current approach with the different sections?
- Dear Ladies and Gentlemen, I consider your's electronic journal very-very good for all which are working in the natural sciences.

5.5 Comments and suggestions by non-scientists

Question: “Do you have comments or suggestions for improving Living Reviews?”

- Great Site!
- I like it the way it is.
- I enjoy Living Reviews just as it is!
- You are doing an excellent job.
- None. You do an excellent job.
- An extremely valuable resource.
- Please keep doing what you are doing.
- Excellent Journal. Very High quality and one of my favorites. I hope your impact statistics reflect the very high quality of your journal.

- To include semi popular/popular articles for people with background in post graduate Physics but are not in academics or are not Physicists by profession but still retain an abiding love for the subject and want to be updated with latest developments.
- Want to read popular/semi popular articles in the topics mentioned.
- I would like to see more physicists take up the challenge of using PLAIN LANGUAGE to describe their ideas using COMMON SENSE. It is not clear, from many papers in physics, whether writers are simply fooling around with formulas, or making physical assertions about reality.
- Above choices are very restrictive and do not describe me well. For instance, I am an independent researcher, and use PDF on and off line in addition to HTML on line.

6 Conclusion

The survey and the analysis of the mailing list have given us a better understanding of who the readers of *Living Reviews in Relativity* are and where they are located, which might be helpful when aiming to broaden the readership or considering special interests.

The group of survey participants consisted of 75% scientists and 25% non-scientists. Given that the articles are written with scientists of at least graduate student level in mind, these numbers might reflect the more than average willingness of the non-scientist readers to reply to the survey rather than the general proportions in the readership .

Survey participants confirmed what download statistics suggested already, readers prefer to download the PDF version for reading. More than 60% of the participants download references and 45% make use of the reference database. Almost 60% of those that replied visit the site at least once a month. This implies that *LRR* has indeed become an important point of reference for a part of its readership. Half of the scientists are interested in reviews in three or four of the subject fields, and Relativity in Astrophysics and Physical Cosmology are at the top of the list.

Finally, we received some very positive feedback and some interesting suggestions.

6.1 Suggestions for future surveys

Think more up front about how we want to make use of the results. Are we just being curious (which is fair enough in a first survey) or do we want to collect data as a basis for further journal development and operation? Then some of the questions should touch topics of that kind. For example, for *LRSP* we could ask whether users are more interested in broad *umbrella*-articles or in reviews covering narrower fields, which are going into more detail.

- Rephrase the “primary field of study/research” question so it becomes clearer for non-scientists what we want to know.
- When asking which article version is read, allow multiple selections, so HTML and PDF can both be chosen.
- When asking whether readers use the reference database or download references clarify what exactly we mean by this, e.g. give an example.

A Appendix: Survey Form

- You are a ...
 - Undergraduate Student.
 - Graduate Student
 - Postdoc/Scientist
 - Non-Scientist
- What is your primary field of study/research?
- Which country do you live in?
- Your main interest is in ...
 - Experimental Foundations of Gravitation
 - Gravitational Waves
 - History of Relativity
 - Mathematical Relativity
 - Numerical Relativity
 - Physical Cosmology
 - Quantum General Relativity
 - Relativity in Astrophysics
 - String Theory and Gravitation

multiple selections possible

- To read an article you are ...
 - using the html version online
 - using the pdf version online
 - downloading the pdf version
 - downloading the html.tar.gz version
- Do you download additional material?
 - movies
 - references
 - source code

multiple selections possible

- Usually you are ...
 - reading complete articles
 - only reading sections
 - browsing for references

multiple selections possible

- Are you using the reference database?
 - yes
 - no
- How often do you visit our journal?
 - once a year
 - 2-3 times a year
 - at least once a month
- In case you subscribe to news and updates from our website, do you use
 - the mailing list newsletter
 - the rss feed
- Which topics would you like to read about?
- Do you have comments or suggestions for improving Living Reviews?

The survey online:

<http://relativity.livingreviews.org/About/survey.html> .