

Self-Archiving and Journal Subscriptions: Co-existence or Competition?

An International Survey of Librarians' Preferences

Chris Beckett and Simon Inger, Scholarly Information Strategies Ltd.



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ABOUT THE AUTHORS

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SUMMARY

A major study of librarian purchasing preferences has shown that librarians will show a strong inclination towards the acquisition of Open Access (OA) materials as they discover that more and more learned material has become available in institutional repositories. The study, which took the form of conjoint and attitudinal surveys, shows that librarians are very sensitive to quality, content cost, the version of the content and how immediately the content is made available.

Overall the survey shows that a significant number of librarians are likely to substitute OA materials for subscribed resources, given certain levels of reliability, peer review and currency of the information available. This last factor is a critical one – resources become much less favoured if they are embargoed for a significant length of time.

One of the key benefits of the conjoint analysis approach used in this survey was the removal of bias by not referring, when testing different product configurations, to any named incarnations of content types, including subscription journals, licensed full-text (or aggregated) databases¹, or articles on OA repositories. The survey tested librarians' preferences for a series of hypothetical and unnamed products frequently showing unfamiliar combinations of attributes – such as a fully priced journal embargoed for 24 months, or content at 25% of the price but through an unreliable service. By taking this approach, the survey measured librarians' preferences for an abstract set of potential products thus avoiding any pre-conceived preferences for named products, such as journals, licensed full-text (aggregated) databases or content on OA repositories.

The data were abstracted into a 'Share of Preference' model (or simulator) which has then been used to model real-life products and thus create predictions for librarians' real-life preferences for these products. It is therefore possible to go beyond the comparisons, in this work, of journals versus OA and to model other preferences, such as between OA and licensed full-text databases.

The key attributes identified in this study, apart for the universal requirement for content quality, were what version of the content (author's preprint etc) is made available and how up-to-date content is (the embargo period) . Specifically:

1. There is a strong preference for content that has undergone peer review. Preference is greatly affected by whether or not an article has undergone the refereeing process; authors' unrefereed original manuscripts were seen as a poor substitute for any post-refereed version of an article. Librarians showed an insignificant shift in preference between any version of an article once it had been refereed, irrespective of the inclusion of editorial changes such as copy editing. Figure 1 (below) shows that the

¹ In this report we use the terms *licensed full-text databases* and *aggregated databases* interchangeably; examples of these are the products offered by companies such as Ebsco Publishing, Proquest, and Gale.

change in the librarian's preference for the subscribed journal over the same content in an OA archive is greatest, in favour of the subscribed journal when the only version of the content available in the OA archive is the author's submitted manuscript.

The effect of the Version of Content in an OA Archive on the change in Preference Share

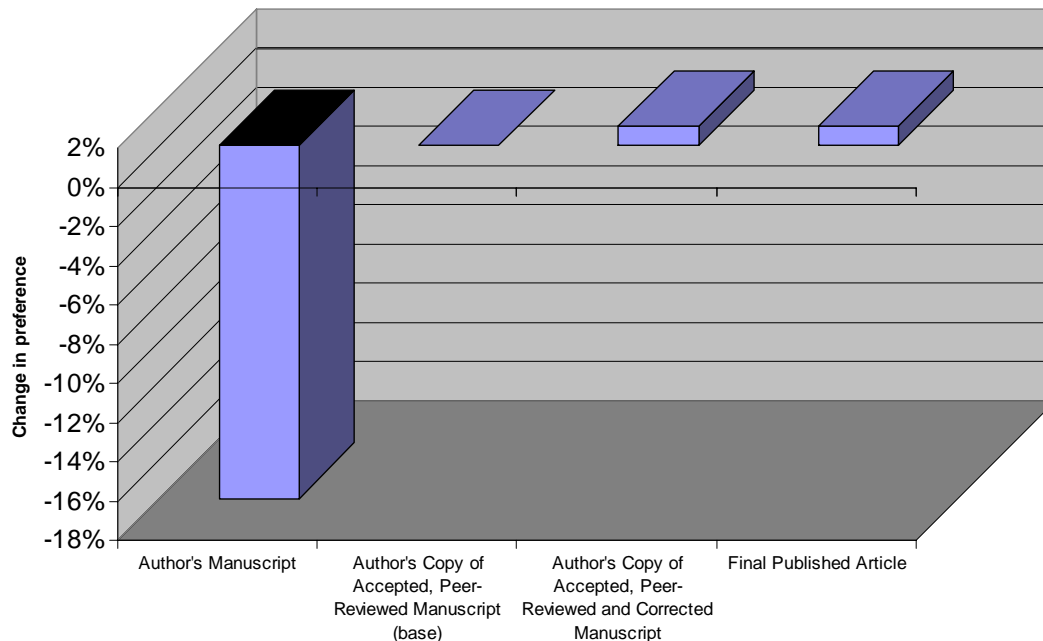


Figure 1 The effect of version of content on the change in preference share

- How soon content is made available is a key determinant of content model preference in librarian's acquisition behaviour; delay in availability reduces the attractiveness of a product offering. The survey tested the effect of embargoes on OA and licensed database content set at 6, 12 and 24 months; a significant impact on librarians' preference for OA, and licensed database, content was seen when embargoes were set to 12 and 24 month. A 6-month embargo has little impact. Figure 2, below, shows the share of preference for degrees of embargoed and non-embargoed content in an institutional repository versus paid-for journal articles, assuming 100% of content is available in the archive. Only when the embargo is extended to 24 months in this model, does the final published article obtain a greater than 50% share of preference.

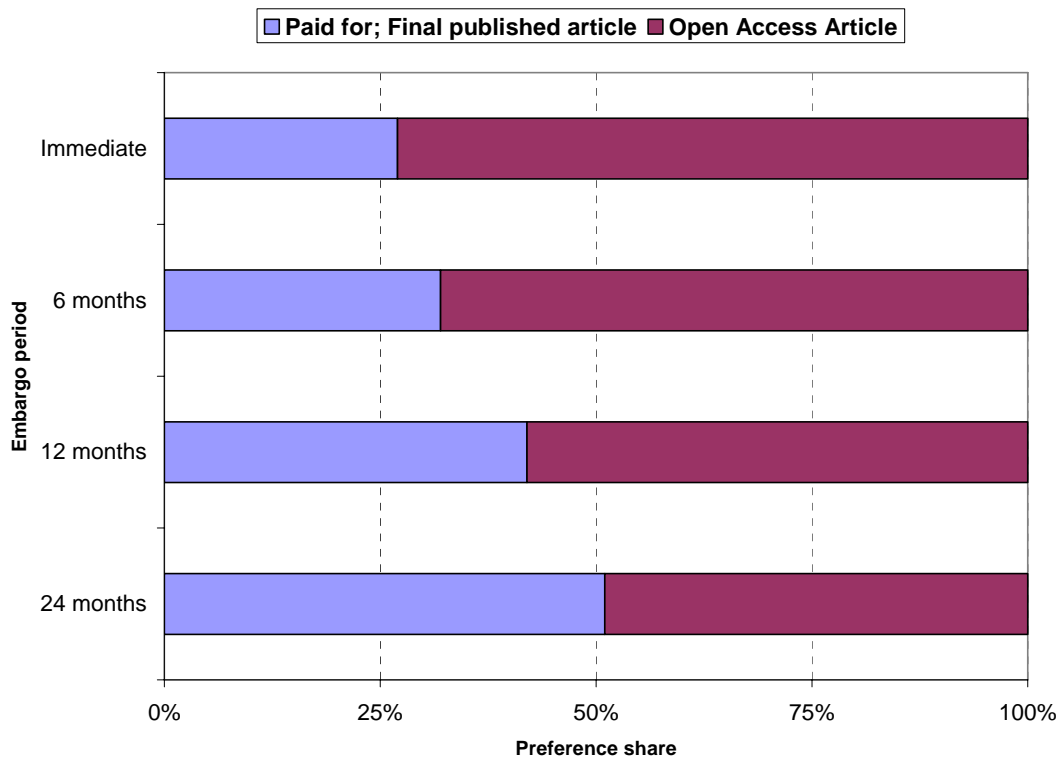


Figure 2 – The share of preference for a paid-for final-published article versus an Open Access article

3. Lastly and perhaps unsurprisingly librarians show a strong preference for content that is made freely available, all other factors being equal. Even as librarians were asked to trade off price considerations against other factors such as the version of the content and the immediacy of its availability, there remained a significant pull towards free content or content whose cost had been greatly reduced.

CONTEXT

CHANNELS OF COMMUNICATION FOR SCHOLARLY CONTENT

Prior to the advent of the online electronic journal in the mid 1990's the channels by which scholarly journal content was distributed were limited and distinct. Print versions were obtained by libraries either directly from the publisher or via subscription agents and electronic versions were only available from the providers of CD-rom databases of journal articles. The journals in these databases were then, and still are, licensed from the primary publisher. The print journal and the CD-Rom licensed database represented two very distinct products, with different functionalities, addressed largely separate markets and were delivered via two very different interfaces – the printed page, and a PC screen only available on a dedicated workstation in a library. The CD-rom database version was limited in its functionality compared to today's electronic journals due to technical limitations of that time. Specifically they rarely had images and were largely limited to ASCII files of the article's content. Researchers obtained content as a result of libraries purchasing the content in whichever form was most appropriate to their institutional remit and requirements.

The last ten years has seen the web become the dominant form of delivery of most scholarly materials and has led to a plethora of other ways in which content can be delivered. Specifically of relevance to this study is the possibility of researchers accessing scholarly articles via the author's self-archived copy rather than via the subscribed journal. The Budapest Open Access Initiative¹ (BOAI) was signed in February 2002 and since then there has been considerable debate and some progress towards enabling and achieving author self-archiving; the goal of strand 1 of the BOAI. Alongside this has been the growth of a market for institutional archive software and also the means to aggregate the scholarly article content distributed across dispersed institutional archives via the Open Archives Initiative Protocol for Metadata Harvesting (OAIPMH)² Via this mechanism search engines, dedicated subject gateways, and Abstracting and Indexing services can harvest the metadata from all archives making the metadata visible in a form appropriate to the target user group and providing links to the full text on the distributed repositories. The net effect of this is to provide, at least in outline, the beginning of a new delivery infrastructure that constitutes an alternative channel by which the researcher can access scholarly article material.

A further impact of the web on the scholarly information chain, in addition to the growth in the number of delivery channels, is that the distinction between these channels has become blurred. In 1995 there was a distinct difference between a print journal and an ASCII representation of the text available on a CD-rom both in terms of content and format. Today the author's self-archived, peer reviewed, formatted and PDF'd article (preprint and post-print), the final published article PDF delivered from the publisher's server and the article PDF delivered from an online licensed database all share many commonalities. They all can

share the same PDF format and all can have the relevant text and images. There are small variations in content, the result of copy editing, and page formatting that are likely to distinguish the author's self archived peer reviewed copy of an article from the final published version. In addition the final published version is likely to have additional functionality such as live hypertext reference links enabling the reader to navigate further through the literature. The licensed database version of the article and the publisher's version are essentially identical - only the means of accessing them varies.

This convergence of format, the rise of ubiquitous search and retrieve mechanisms such as Google and the universality of web based delivery all combine, from the researchers perspective, to obscure where an article comes from, whether or not it is the final published version, and the price if any that was been paid for it. In addition paid-for-content is often delivered through third party interfaces such as Google where the source of the content and the fact that it has been paid for via a library license is often hard to recognise. Much paid for content appears free to the researcher.

ALTERNATIVE ACQUISITION METHODS

Currently most content is delivered to researchers as a result of an acquisition decision made by a librarian. The librarian today has multiple choices as to how the same article can be obtained electronically; via a licensed database, via a journal subscription, and potentially, as the volume of self archived material grows, via an institutional or central repository of author self-archived content.

Given this, scholarly publishers have an interest in discovering how these alternative acquisition choices are perceived by those librarians responsible for selecting and acquiring content. Publishers need a clearer understanding of the main drivers behind selection decisions as they apply across these alternative ways of obtaining content, and therefore whether or not these alternative acquisition routes are likely to affect their current core business of selling journal subscriptions to libraries. Specifically they need to develop models which can predict behaviour.

It has been argued by Swann³ that in the long term libraries will continue to subscribe to journals, even when some or all of the content is freely available on institutional archives. According to this argument librarians will not cancel journal subscriptions even when much or all of the content of those journals is freely available on an institutional or subject archive.

This hypothesis is supported by the lack of any evidence in the discipline of physics specifically, for an increase in cancellations of the physics journals published by the American Physical Society (APS) or Institute of Physics (IOP) even though all the content of some of their journals is available in the physics pre-print archive. Specifically:

“Nevertheless, the evidence there is to hand points to the likelihood that the peaceful — and perhaps mutually beneficial — co-existence of traditional journals and open access archives is entirely possible; in biological terms,

mutualism, rather than parasitism or symbiosis, might best describe the relationship.”

In the context of this study it is worth noting that the physics pre-print archive contains content with mixed characteristics. Some of the content has not been peer reviewed, a percentage of it has. It may be therefore that the absence of any visible impact on subscriptions is because the percentage of non-peer reviewed, non-canonical content, makes the archive a poor substitute for subscription journals. Equally however the absence of any evidence for cancellations from any publisher in physics or any other discipline suggests that in current conditions no immediate threat to subscriptions has been identified or at least notified by any publishers. This study seeks to identify if and how this might change in future.

It's worth noting that one of the physics publishers consulted by Swann – the Institute of Physics - has subsequently reported differential download rates for the content on both their site and ArXiv. In a conference presentation⁴ IOP have reported that

“Titles not well covered by arXiv have mid- to high usage at our site.....Titles covered by arXiv have low use at our site”.

There may be numerous explanations for this, however the underlying concern of publishers generally in this context is likely to be that if librarians are using usage data to inform cancellation or renewal decisions, and that data does not include usage data (relating to any version of the article that has completed peer review) from archives such as ArXiv, then the value added by the publication process may be under-recorded. Solutions to this in terms of feeding download and citation statistics to individual publishers have been proposed by Berners Lee and others⁵.

One of the product entities studied in this report alongside subscription journals and journal articles available on Open Access archives, is the licensed full-text database. Readers familiar with the characteristics of these databases can skip this paragraph. Licensed full-text databases are databases of journal content produced by specialist third party companies. These companies aggregate in large databases, with uniform search interfaces, the journal articles of many of the major scholarly journal publishers. Scholarly publishers license their content to these third parties in return for a royalty. The royalty paid to a specific publisher is typically based on a combination of a percentage of the value of the sale of the database as a whole and usage of that specific publisher's articles. The content of these databases is typically subject to embargoes that the licensing publisher puts in place, that limit the currency of the database. Typically publishers put in place a six month embargo.

In the context of licensed full-text databases Cox⁶ has put forward a similar argument to that of Swann's. In his report for ALPSP it is argued that the widespread availability of the final published peer reviewed article in licensed full-text databases published by organisations such as Ebsco Publishing and ProQuest similarly has little effect on journal subscriptions.

“Most journal publishers are nervous about the risk of their journal subscriptions being supplanted by aggregated databases; if the journal is licensed to an aggregator, they fear that subscriptions will be cancelled. However, the available evidence indicates that the principal drivers of journal cancellations remain budget and space constraints:

- *Primary journals and aggregated databases are seen as complementing each other; they are really different products;”*

and that:

“Moreover, the journal content in an aggregated database is a poor substitute for the journal itself, because it is not necessarily complete or a stable component of the database, may be subject to an embargo, and is not seen as an authoritative version for researchers....”

and further:

“The journal is ‘the real thing’. This was emphasised by 17 of the 23 librarians interviewed.”

These arguments concerning the relationship between licensed full-text databases and journal subscriptions echo Swann’s description of a relationship between OA archives and traditional journals based on mutualism. However, elsewhere in the report it is stated that:

“Only [sic] six out of 23 [librarians] admitted cancelling journals because they were included in aggregated databases.”

(26 percent of those surveyed therefore reported cancelling journals because they were in aggregated [or licensed full-text] databases, which somewhat contradicts the headline findings from the Cox report, but co-incidentally echoes the findings in this PRC study.)

The essence of both these arguments is that the availability of free (in the case of OA) or very cheap (in the case of licensed full-text databases) versions of articles have no effect on journal subscriptions.

Both arguments rest largely on anecdotal evidence or small surveys. In the case of Swann on conversations with two physics publishers and in the case of Cox on structured telephone interviews with twenty three librarians supplementing a substantial body of anecdotal information.

Both OA and licensed full-text databases can therefore be seen, according to these arguments, to be additional supplementary ways of authors and publishers gaining exposure for their content. In both cases this is asserted to have no negative impact on subscription revenues, and additionally in the case of the Cox study it is argued that the income from licensed databases is almost entirely supplementary to the revenue obtained from journal subscriptions.

“The balance of advantage remains strongly in favour of extending readership and enhancing overall revenues.”

While both reports represent insights into the reported actual behaviour of librarians, it was thought prudent to undertake some larger statistical studies into the underlying factors that may influence librarians’ journal acquisition decisions in future, as the ways of obtaining content multiply. Publishers have a vested interest in confirming or otherwise whether the relationship between content on institutional or subject archives and subscriptions is one of mutualism or not. A large percentage of their current revenue depends upon it. In particular both they and librarians (although for different reasons) have an interest in identifying at

what point switching from one means of acquiring content to another is likely to make sense. Identifying the tipping point (if there is one) is of importance to libraries because it provides a marker as to when they can begin changing their acquisition behaviour and for publishers because it provides an indication of when revenues are likely to be significantly threatened.

Previous work in this area sponsored by ALPSP ⁷ generally concluded that content on OA repositories are clearly not seen [now] by librarians as a substitute for properly managed journal holdings. However it also concluded that 53% (rising to 81% in the next five years) saw the availability of content via OA archives as an important or very important factor in determining cancellation.

More broadly a better understanding of the factors that generally determine acquisition behaviour in different sectors and different geographical markets will assist publishers in developing more effective editorial, product development and sales and marketing strategies.

OBJECTIVES

The objectives of this study were as follows:

- To identify and prioritize the main factors that determine librarians' acquisitions decisions.
- To model how these factors interact and therefore identify the combination of product factors with the most appeal.
- To look at librarians' intentions in respect of whether or not author self-archiving is likely to result in cancellation of library subscriptions.
- To identify at what point substitution of one product for another (author self archiving or licensed database access for library subscription) is likely to take place and how these interact i.e identify the tipping point.
- To investigate librarians general attitudes to self archiving .

Given that a key objective of the research was to predict the choices that decision-makers would make based on a competing set of alternatives (i.e. acquiring scholarly information from sources other than directly from the primary publishers), it was decided to utilise for the project a form of conjoint analysis (specifically the latent class, maximum-differential approach). By presenting respondents with a series of anonymous product configuration scenarios and asking them to select the one they preferred the most and the one they preferred the least, it is possible to infer the relative importance of different attributes of scholarly content in driving their acquisition choices. It also enables the creation of a 'share of preference' model that predicts the likely uptake of different product configurations. (See Method)

The following analyses were prepared to support this paper:

- Conjoint analysis of the most important factors that librarians will take into account affecting purchasing, renewal and collection development.
- Identification of librarian segments based on their purchasing needs.
- Attitudes towards Open Access archiving and repositories.
- Predicted behaviour based on the impact of different scenarios using a simulator that was created as part of the analysis.
- Detailed sub-group analysis to identify how sub-groups differ in terms of purchasing behaviour.

RESULTS

INTRODUCTION

For the conjoint analysis, 6 *attributes* were tested². Respondents were presented with different *levels* of each *attribute* (see Appendix D) to identify the point at which they would trade one *attribute* off against another and thus their relative importance. The attributes tested were:

- Version of Article
- Percentage of a journal's articles that are available
- Reliability of Access
- How up-to-date is the content
- Quality of the content
- Cost

² Initially additional attributes were included in a trial version of the survey, but these were modified and reduced from eight attributes to six after librarian feedback indicated that, with eight, the survey would have been too complex. The two attributes that were included in the original draft conjoint survey but subsequently excluded were "Archive and Permanence" and "Importance to your Collection."

ACQUISITION PREFERENCES IN DIFFERENT MARKET SCENARIOS

Overall Importance from Conjoint Study - $n=424$

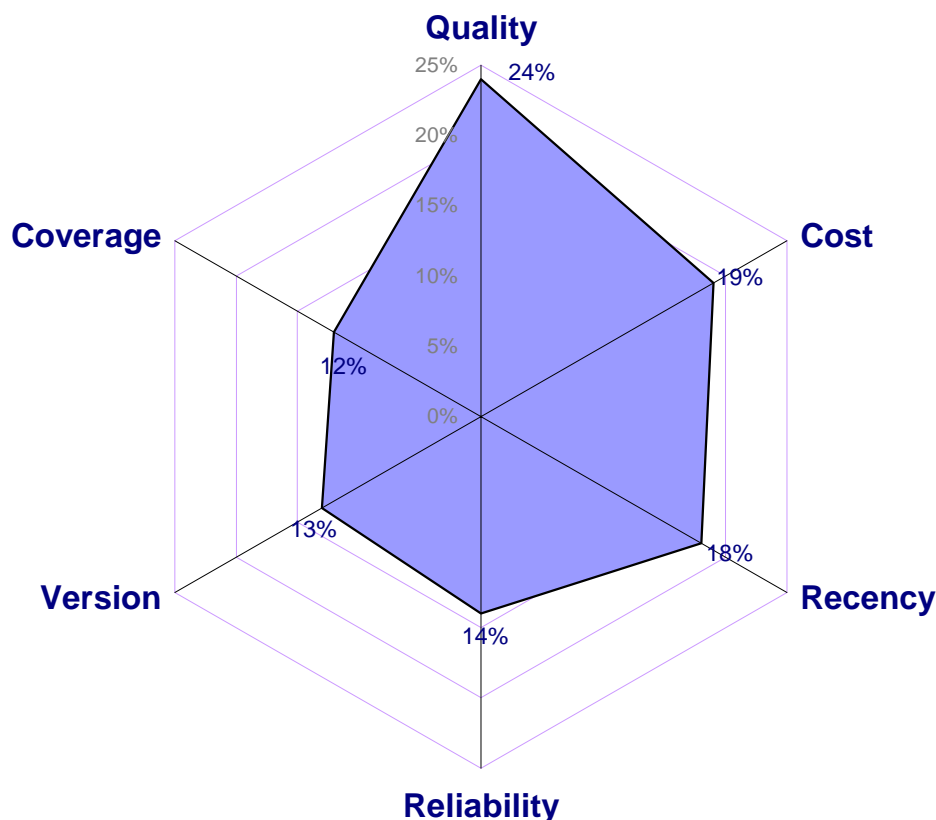


Figure 3 – Overall importance of attributes as a radar plot

Figure 3 shows the overall importance of the attributes tested in the conjoint analysis. Respondents were, on average, influenced by each of these attributes proportionately to the percentages shown³. The chart shows that the strongest influence is content quality, taking priority over cost and other attributes. Of course it is important to recognise that in comparing the likelihood of acquisition of an article that forms part of a journal or the same article as part of a licensed full-text database or indeed as part of an institutional repository, the content quality becomes irrelevant. It is, after all, the same article irrespective of where it is published (save for the changes applied during the editorial process which are addressed

³ To the statistical layman, perhaps the best way of understanding this radar plot would be to consider people pulling on the corners of a hexagonal trampoline; pulling in proportion to how important they felt each attribute was. As such the strongest pull is towards content quality, then cost, recency, reliability and so on.

under *Version*). Content quality was only included in the conjoint analysis because librarians in trials had difficulty making a selection decision (one product versus another) without the inclusion of a statement of quality. Quality is the over-riding factor.

For the purposes of our study, however, which is to extrapolate from the conjoint analysis results a model which can predict behaviour, we will always compare like-for-like content; in other words the *Quality* variant will be kept constant.

Figure 4 shows the relative importance of each of the *attributes* and within each *attribute*, the influence of each of the *levels*.

'*Quality of content*' has the greatest impact as has already been discussed.

This is followed by '*Cost*' and '*Recency of publication*' as the next most important and these are the main factors that would be considered for a given quality of journal.

Of the other attributes there is little difference in values so they have a similar, and lesser, influence on decision-making. They are, in order of importance: *Reliability of Access*, *Version Availability*, *Percentage of Articles Available*.

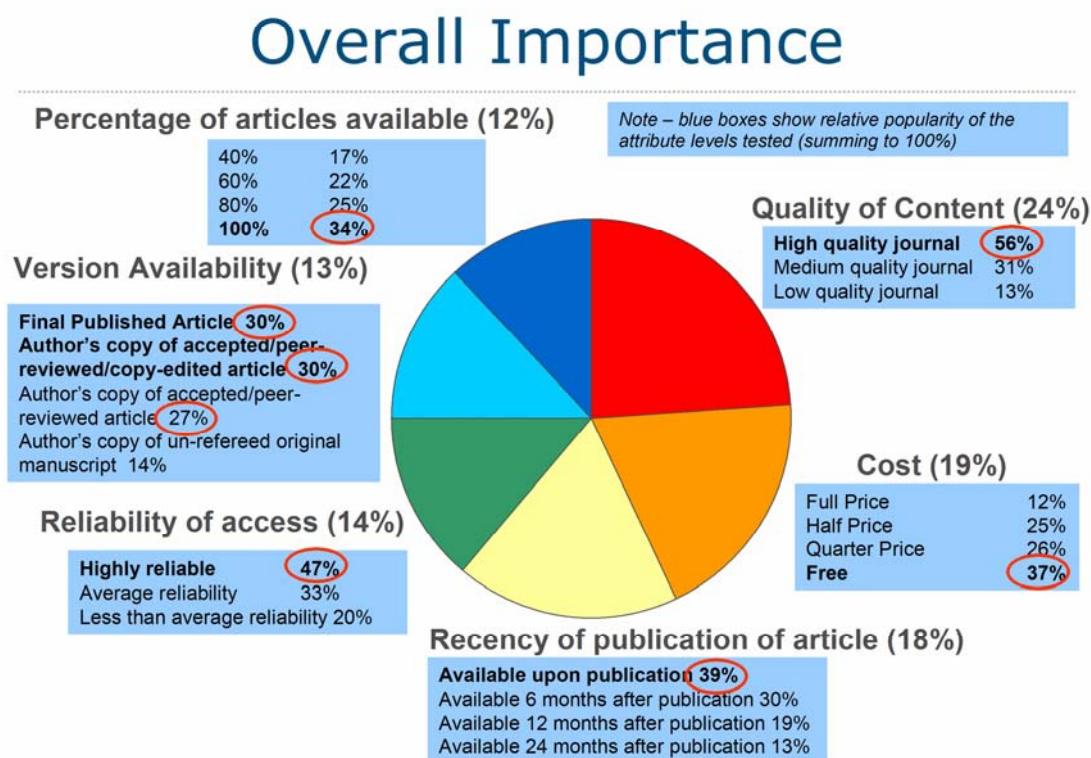


Figure 4 – Overall importance of attributes and their levels

The values associated with the different *levels* of each *attribute* indicate how likely librarians would be to select that *level*, all other *attributes* being equal. It shows that:

- The importance of acquiring high quality content is likely to over-ride other factors.
- Having the article for free is influential but other factors over-ride this consideration in the majority of occasions. Librarians show the greatest response between 'free' and 'paid-for', and within the 'paid-for' levels, there is a significant response when moving from 100% to 50% price.
- There is value attached to having an article available upon publication but many are happy to wait 6 months until after publication. An embargo of 12 months or more makes the scenario rather less attractive.
- Although less important as a factor, having highly reliable access is a differentiator.
- Librarians are willing to compromise on the article version with no difference between the final published article and the Author's copy of the accepted peer-reviewed article but there is rather less interest in the 'Un-refereed original manuscript'. As a result there is clear perceived value in peer-review but the copy-editing process apparently adds little to this value. This is a critically important result from the survey and is discussed in more detail later.

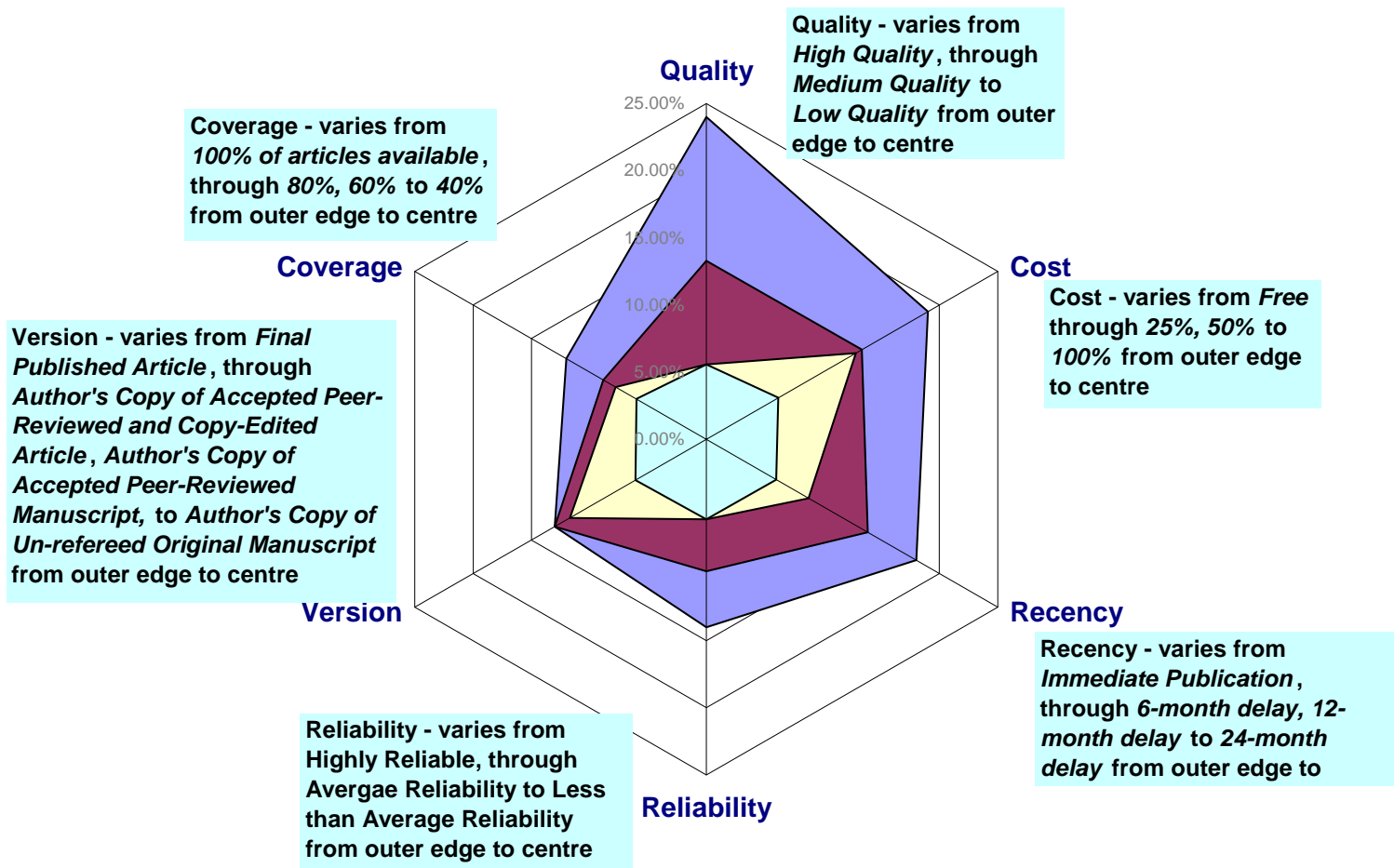


Figure 5 – Overall importance of attributes and their levels – shown as a radar plot

Figure 5 represents the same data in an entirely graphical way. The blue shape is the same as shown in Figure 3 and represents the influence of the *attribute* overall, while the concentric polygons contained within it represent the *levels* tested within the *attributes*. The closer together that any two apexes sit, the smaller the difference between the two levels. The four levels within *Recency*, for example, show a significant difference, whereas the levels within *Version* are much less highly spaced, with the *Published Version* and the *Author's Copy of the Accepted, Peer Reviewed and Copy Edited Article* being held in the same favour.

The purpose of this study has been to use the conjoint analysis results to show a share of preference for acquisition of journal articles from a variety of sources. As already discussed, although *Quality* is the over-riding factor, this is not relevant in a comparison of like-for-like content.

Cost is the next most potent driver. The data clearly show that librarian preference is very strongly influenced by cost and thus one might expect that librarians will begin to prefer Open Access materials because of the price issue.

Another significant influence on selection is that of *Recency*. Allowing authors to self archive, but only after some time delay, has a significant impact on the preference that librarians would show towards Open Access materials.

EXPLANATION OF THE MODELLING PROCESS

One of the outputs from this work has been the creation of a *Share of Preference* model. Utilising the data about the relative 'pull' of each *attribute* and each *level* within each *attribute*, it is possible to map the likely take-up of different (and potentially hypothetical) products.

Although the conjoint analysis never labels products as being a journal, a licensed full-text database or an indexed collection of Open Access content, the variables we asked respondents to consider, when combined in certain ways, do effectively represent these services. By taking the selection of content into the abstract realm of indicating preference within unfamiliar product offerings, we are able to separate out their criteria for selection, removing any "belief" in the correctness or otherwise of any given approach. Indeed, even though the conjoint survey asked librarians to choose between perhaps high quality content at 25% of its normal price or low quality content at 100% of the price, we are still able to model how librarians would have chosen between items of equal quality and merely differing price.

The reader should be aware that, when completing the survey, the respondents were asked to consider a number of hypothetical products each of which were equal in respect of further non-tested attributes. These attributes were "Findability or Discoverability"⁴; "Relevance to your library"⁵; and "Archiving arrangements"⁶. This means that when we look at using the model to predict behaviour for librarians choosing between products that each have a set of attributes that the authors believe most closely represent subscription journals, open access repositories or licensed full-text databases, we must always be mindful that this prediction is subject to the additional untested attributes as being equal across all the modelled products.

As we map the abstract choices back to a prediction of behaviour, we select more meaningful combinations of the parameters to best represent given products. In all cases, however, we compare like with like in quality terms, because in the selection process, where a librarian might be seeking to acquire a number of articles through the purchase of a journal, or substituting access via Open Access content, we are of course always talking about the same articles. Hence, when comparing an article in a journal with the same article in an Open Access archive or licensed database, quality becomes a non-measure in the selection process. The inclusion of content quality within the conjoint analysis, although meaningless when

⁴ Findability or Discoverability – how easy it is to find the content itself. In an Open Access environment, content is quite easily found through Google, of course, but in addition its discoverability could be enhanced through commercial gateways or links from Abstracting & Indexing resources.

⁵ Although in initial testing this emerged as a pertinent attribute, subsequent discussion with librarians seeking a simplification of the survey suggested that this could be sacrificed in order to preserve other attributes. The general consensus was that this attribute could, in the context of any individual library, be taken as read.

⁶ Archiving arrangements are clearly an important factor, and these were sacrificed in the conjoint exercise reluctantly.

making like-for-like substitutions, was merely there to make it easier for those who could not consider such abstract combinations of attributes without the caveat of content quality.

The 'Share of Preference' that the model produces can be considered an indication of the percentage of librarians that would acquire content in one way rather than another. It cannot be taken as a percentage of the subscriptions that might migrate to Open Access not least because not all librarians purchase the same number of titles and so one cannot simply multiply numbers of libraries by the average journals per library to arrive at a figure for a number of subscriptions that might be replaced by an Open Access alternative.

It is perhaps most useful when looking at the 'share of preference' to consider the trends in preference as *attributes* are changed rather than the absolute percentages reported.

Using the model we find little variation by *Reliability of Access* so we have made most of our subsequent studies in circumstances where the reliability of access to content, whether in published journals or Open Access, are taken as being equally reliable (in terms of being able to retrieve information). It would be unreasonable to assume that the access routes to Open Access will be any less reliable than any other content delivery solution in the medium to long term.

SHARE OF PREFERENCE BETWEEN JOURNALS AND OPEN ACCESS CONTENT

INFLUENCE OF AVAILABILITY

Purchasing Preference varied by Percentage of Material Available via Open Access in a 2- product model

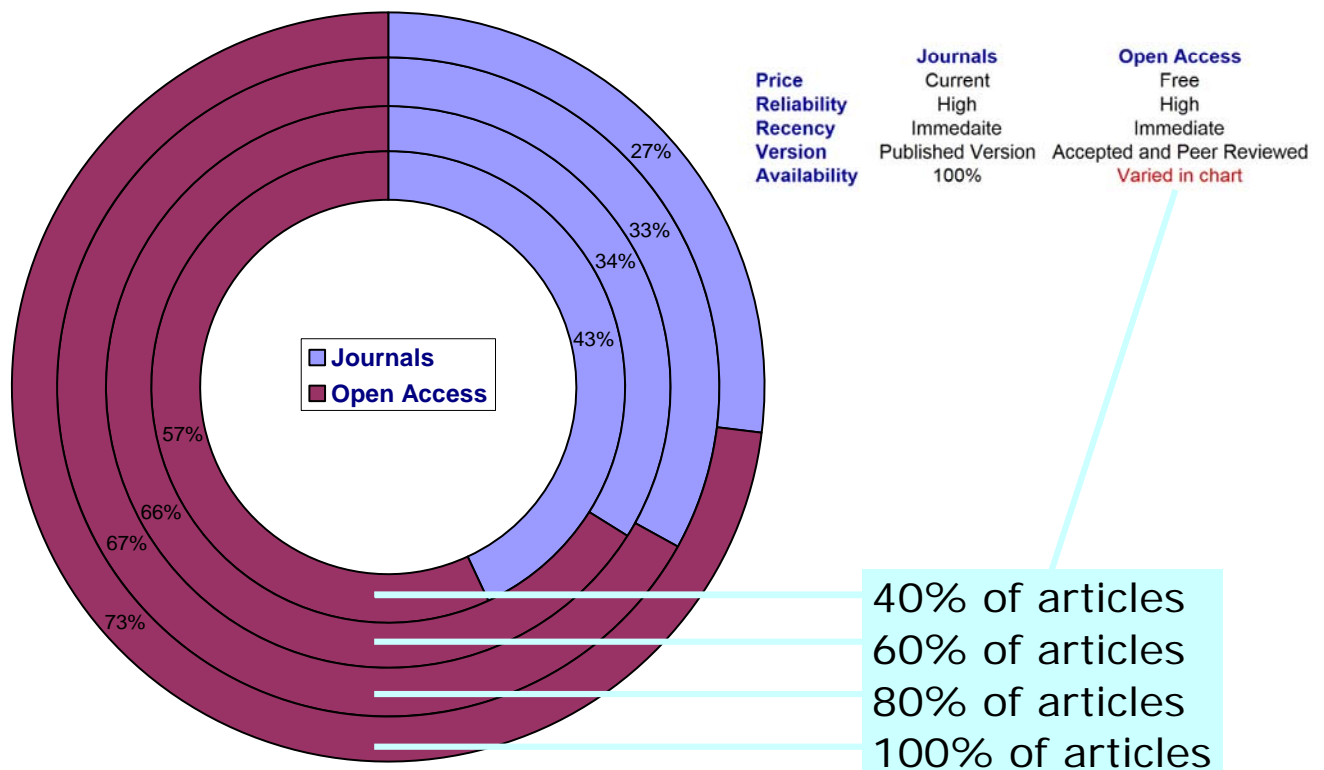


Figure 6 – Mapping the effect on purchasing preference of a change in availability

The conjoint survey asked respondents to make choices between the varying percentages of articles available in a variety of product offerings. From this we are able to look at the effect on choice of varying just this “Availability” aspect, with all other parameters remaining constant.

We have taken those parameters that best describe Open Access today⁷ and those that best describe published journals today and then varied just the percentage of the journal's articles available via Open Access in order to study the impact of availability on librarian choice.

The data show a significant shift of preference towards Open Access as increasing percentages of journal articles become available via Open Access.

⁷ The authors when setting the OA parameter for “Version” set it to “Accepted and Peer Reviewed” - the “Version” attribute level closest to the *Final Published Article*.

- Where 40% of articles are available by Open Access, only 43% of librarians' preference is for journals, falling to just 27% of preference when 100% of articles are available by Open Access.

These results may appear not to be concurrent with the current observed behaviour and choices, especially within physics where it is widely accepted that a very high percentage of content is available via arXiv. This may be due to a number of factors including:

- That the content "Version" available in ArXiv can vary between preprint and peer reviewed post-print which is not the "Version" modelled here.
- That widespread librarian awareness of these archive resources is low⁸.
- That librarians are looking for a gateway-style, common-overlay to Open Access content.
- That librarians are looking for compatibility of Open Access gateways with Link Resolvers and other invested library technologies.
- That there are other more emotive factors or conservatism that stand in the way of the predicted behaviour.

⁸ Anecdotally, the authors perceive that awareness of Open Access repositories is still rather low, and is borne out by their experience in working in the library technology training arena.

INFLUENCE OF ARTICLE RECENCY (EMBARGOES)

Purchasing Preference varied by Recency of Articles via Open Access in a 2-product model

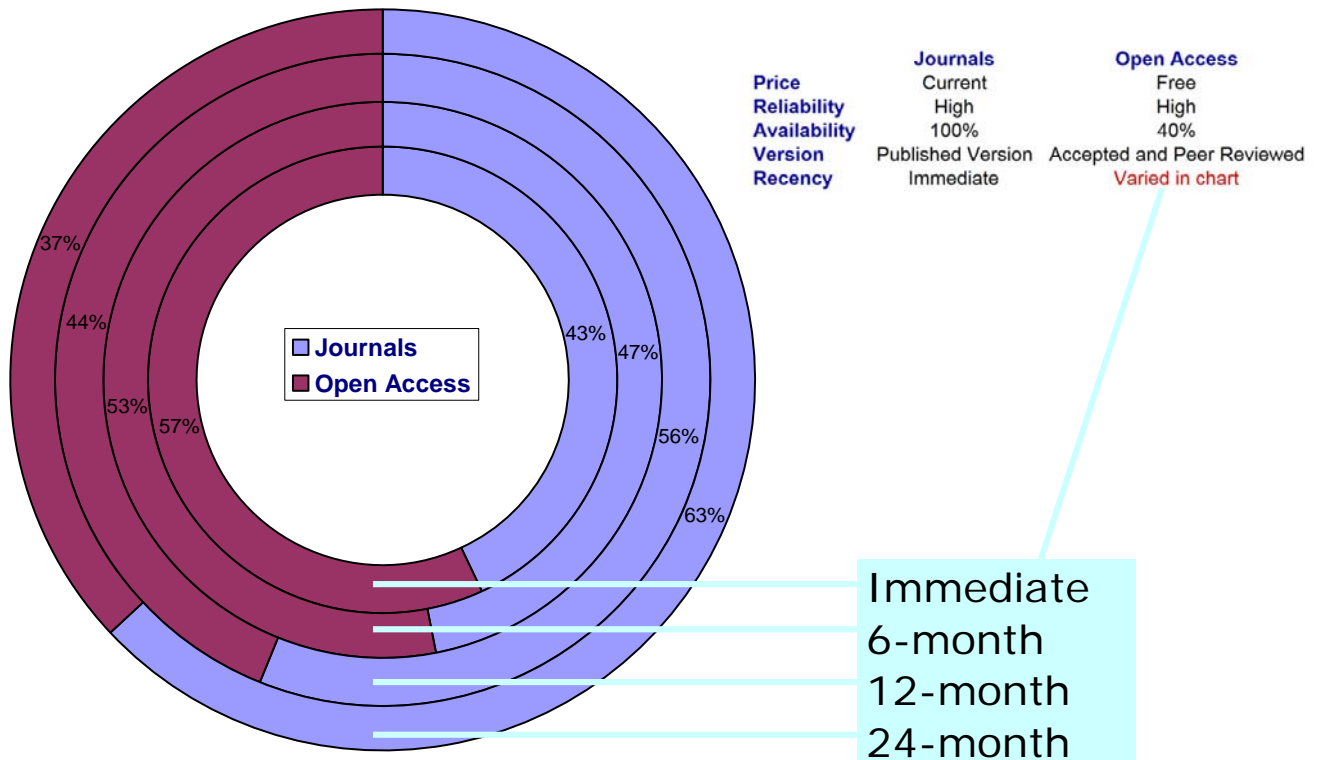


Figure 7 – Mapping the effect on purchasing of a change in Recency

It should be noted that the predictive model results in *Figure 7* show that a delay (of 12 months or more) in the availability of content via Open Access has a great effect in the share of preference that Open Access earns. The preference for Open Access content declines from a 57% share where immediate archiving is taking place, to 37% share when there is a 24-month embargo. However a 6 month embargo makes little difference (from 57% to 53%) This model, never predicts a more than a 63% preference by librarians' for journal subscriptions over OA, even with a two-year embargo.

This model is based on only 40% of a journal's articles being available within Open Access but of course preference for Open Access increases if article availability increases. With no embargo and 100% availability the share of preference reaches 73% (as opposed to 57%). The importance of the embargo period echoes findings from the ALPSP study.

INFLUENCE OF ARTICLE VERSION

Purchasing Preference varied by Article Version via Open Access in a 2-product model

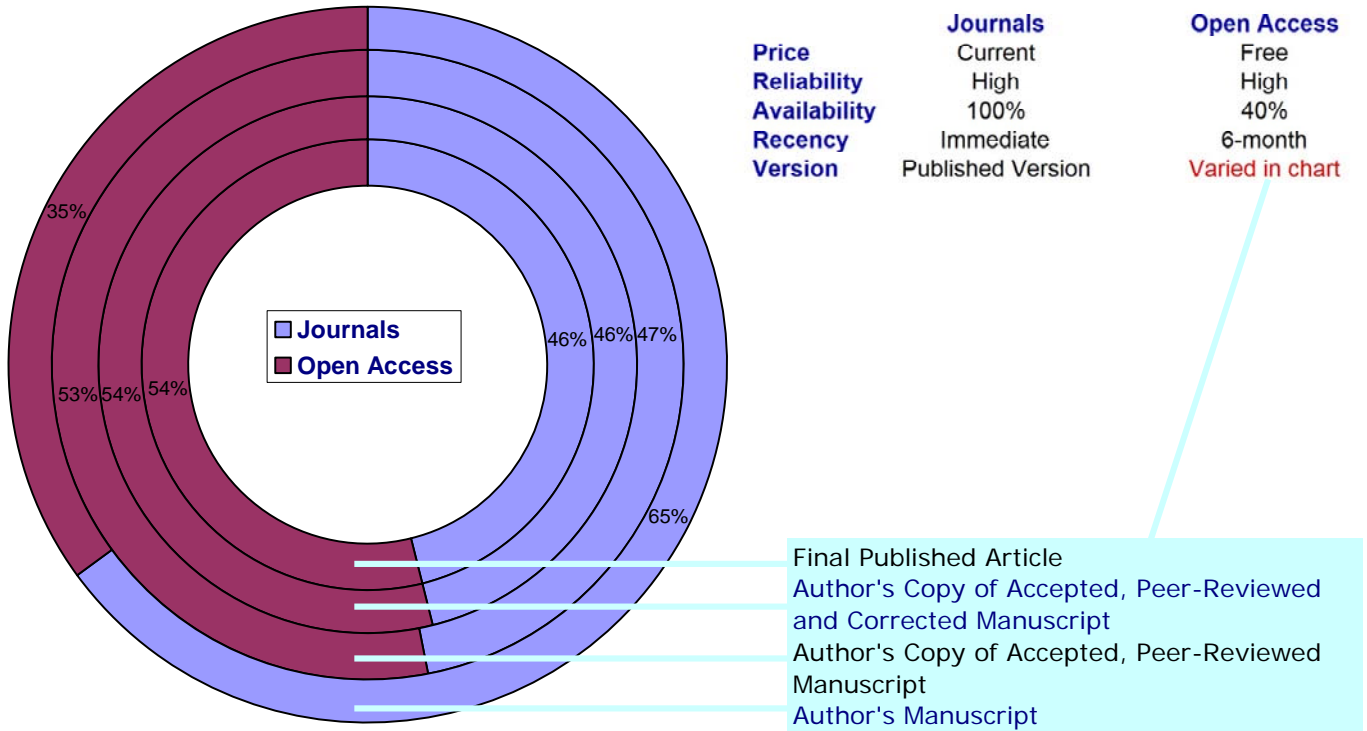


Figure 8— The effect of article version on acquisition preference

The version of a research paper that is self-archived has very little effect on acquisition preference as long as the article has been through the peer-review process, as shown in *Figure 8*. This is significant because placing limits on the versions that publishers allow authors to post will not affect the take-up of open access unless posting is restricted to the author's unrefereed manuscript. An author only needs to put online the peer reviewed version of the manuscript to achieve almost the same level of preference as posting the final published version.

Figure 8 shows that even with only 40% OA availability, the Authors copy of the accepted and peer reviewed manuscript achieves a 53% share of preference, compared to 47% for journals.

SHARE OF PREFERENCE IN A THREE PRODUCT MODEL

The *Share of Preference* model also allows for a three-way comparison of preferences. *Figure 9* shows how the share of preference may work between journals, OA content and aggregated databases.

The authors selected a series of parameters that most closely represent the *status quo* for journals and licensed full-text databases and varied the embargo period that OA content is subject to. The authors of this study elected for 100% availability within journals and full text licensed databases (which would be true for content for any given journal) and 40% from Open Access (an approximation). They were deemed to have the same reliability, and the price for aggregated databases was set to 25% as a closest approximation to the real world price available within the model⁹.

Purchasing Preference varied by Recency of Articles via Open Access in a 3-product model

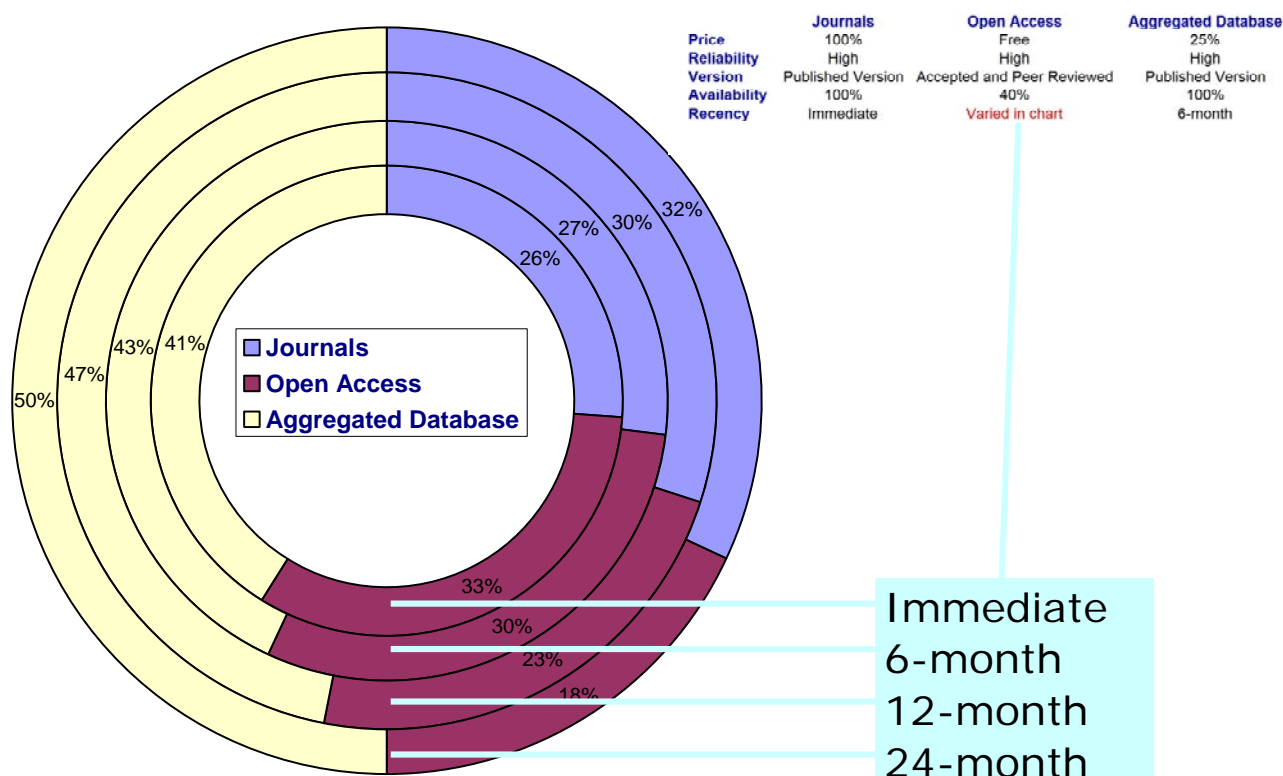


Figure 9 – The three-product model – 6 month embargo on Aggregated database

⁹ The authors accept that the 25% price level selected may not be the best approximation for aggregated databases, not least because it is not possible to acquire individual components of the data as it is with journals or open access, nor is it necessarily the appropriate price point if the library actually consumed effectively all of the content in the aggregation. In other words the effective price point may be only 5% for a library that made use of all the content in the aggregation.

Although the Open Access version was set at the 'Accepted and Peer Reviewed' version, the share of preference was the same for any peer-reviewed version (as discussed earlier). *Figure 9* bears out the importance of Recency in the share of preference. As the Open Access content is embargoed further and further, the share of preference for the Aggregated Database content grows to 50%, if the embargo on the latter is only 6 months.

DEMOGRAPHIC DIFFERENCES IN THE CONJOINT STUDY

There are very few demographic groups that show any significant variation away from the observed data in the conjoint study. Some differences were found for Corporate Libraries and Asian and Australasian libraries. *Figure 10* shows the extent to which Corporate Libraries can be seen to differ in their priorities.

Overall Importance from Conjoint Study with overlay for Corporate Libraries

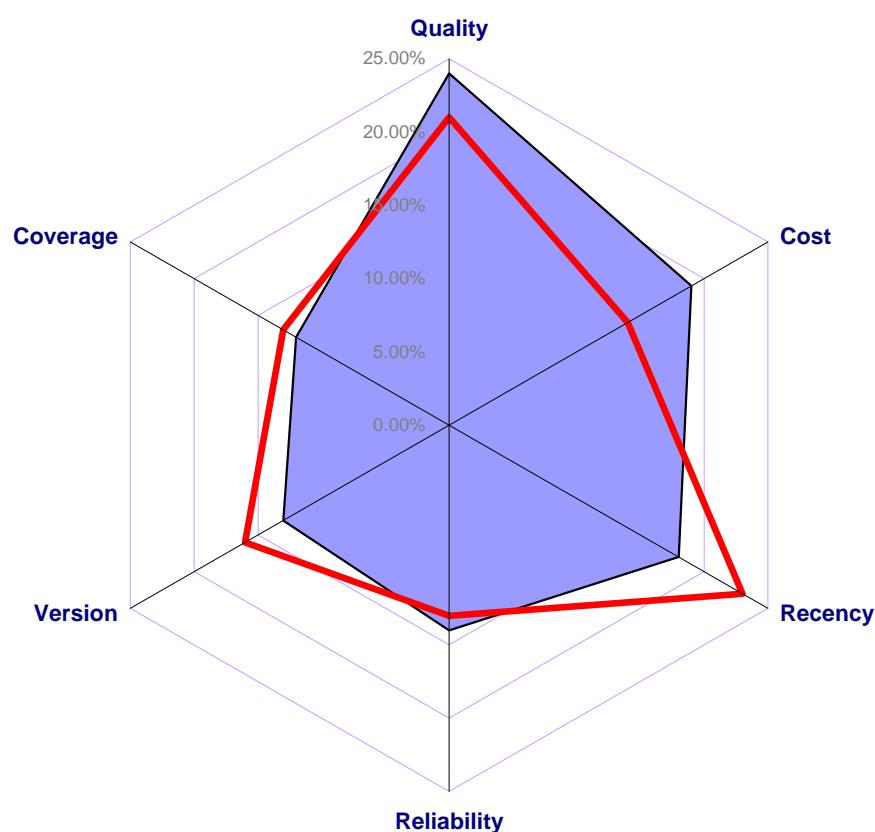


Figure 10 – Corporate library variation in behaviour

Corporate librarians are less cost sensitive and place more emphasis on *Recency* of publication and *Version Availability*. These results are probably no surprise to industry commentators; often corporate library collections are highly focused and the delivery of up-to-date, reliable information to staff is usually paramount.

Overall Importance from Conjoint Study with overlay for Asian and Australasian Libraries

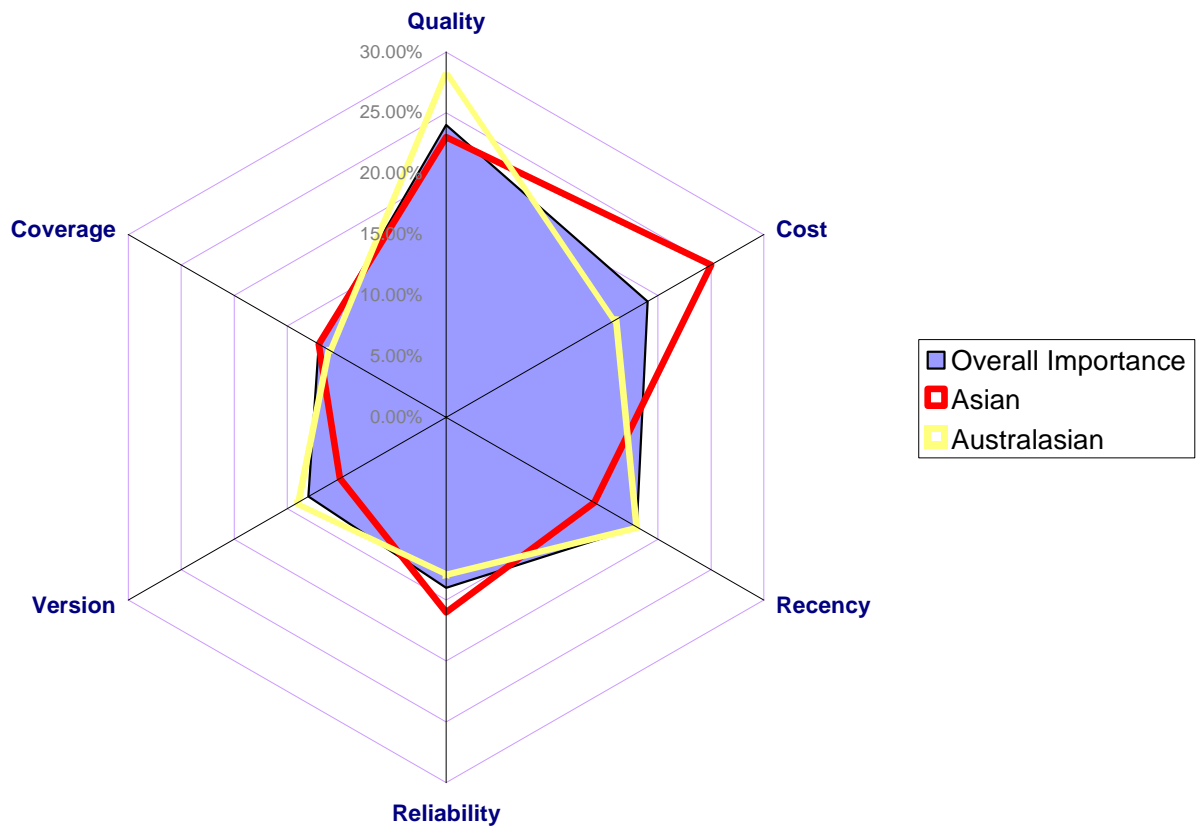


Figure 11 – Asian and Australasian library variation in behaviour

Figure 11 shows that librarians based in Asia are more *Cost* sensitive and place less emphasis on *Recency* and *Version Availability*. Australasian libraries show a reduced *Cost* sensitivity.

ATTITUDES TO OPEN ACCESS

In the attitudinal survey, librarians were asked to state the level to which they agreed or disagreed with a number of statements concerning Open Access. {Appendix E}

Figure 12 shows that:

- The great majority of librarians surveyed welcomed the challenge that Open Access presents to traditional publishers.
- While many disagree, there is a high level of confidence in the reliability of content on Open Access archives.
- Only 38% believe that publishers should not worry about libraries cancelling subscriptions because of Open Access repositories, and as many disagree (or think that publishers should worry).

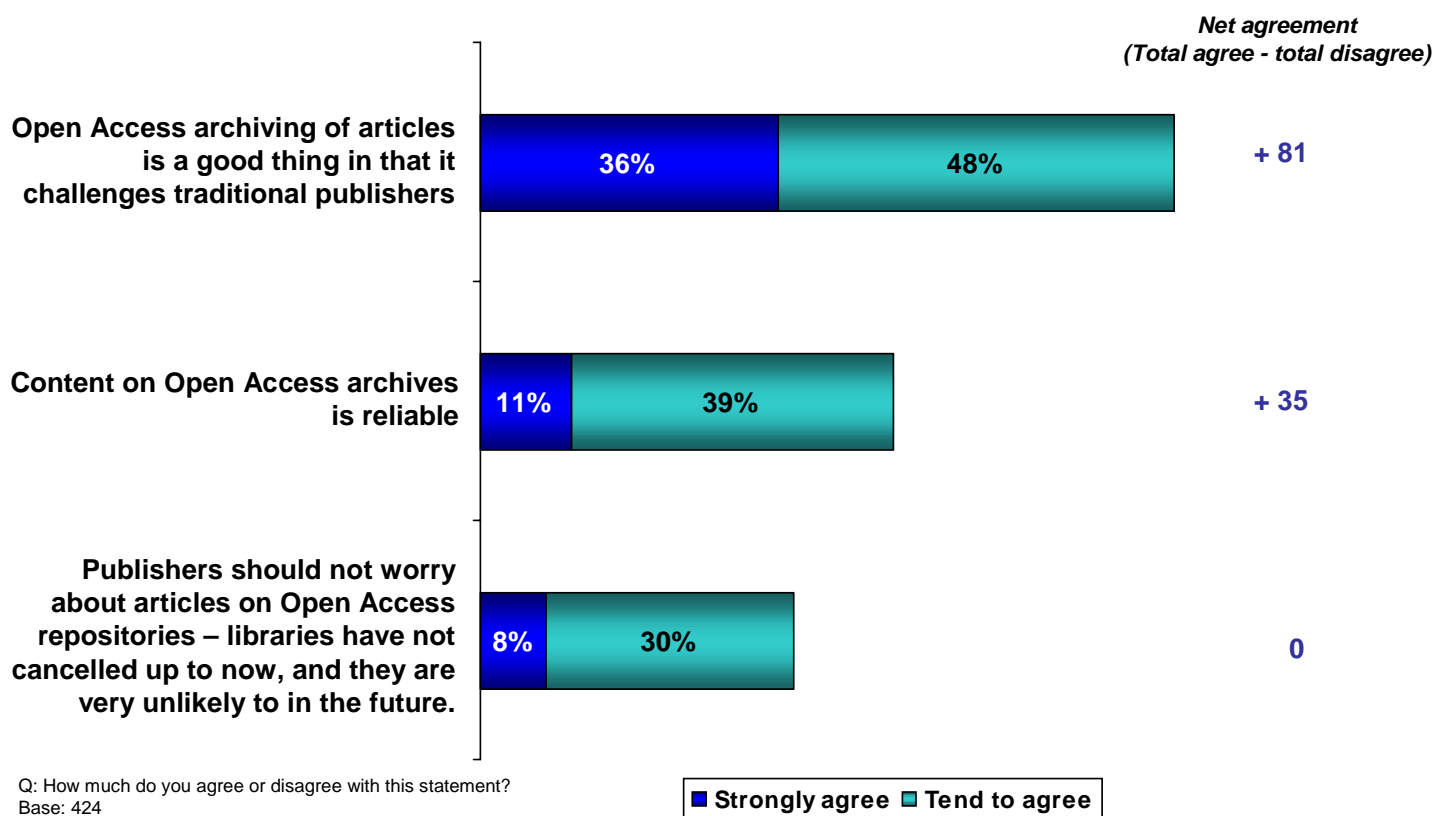


Figure 12 – Attitudinal study (part 1)

Figure 13 shows that:

- As many as 40% believe that libraries are wasting their money subscribing to journals when almost the same content is available for free on repositories; but a similar proportion disagree.
- There is concern about the impact repositories will have on journals' viability, though 31% believe it will have no impact.
- Just a third agree that Open Access will impact negatively on low quality journals only, implying that it will also impact negatively on high quality journals.
- A minority (just 26%) believe that journals will be forced to charge authors and more believe this won't be the case.

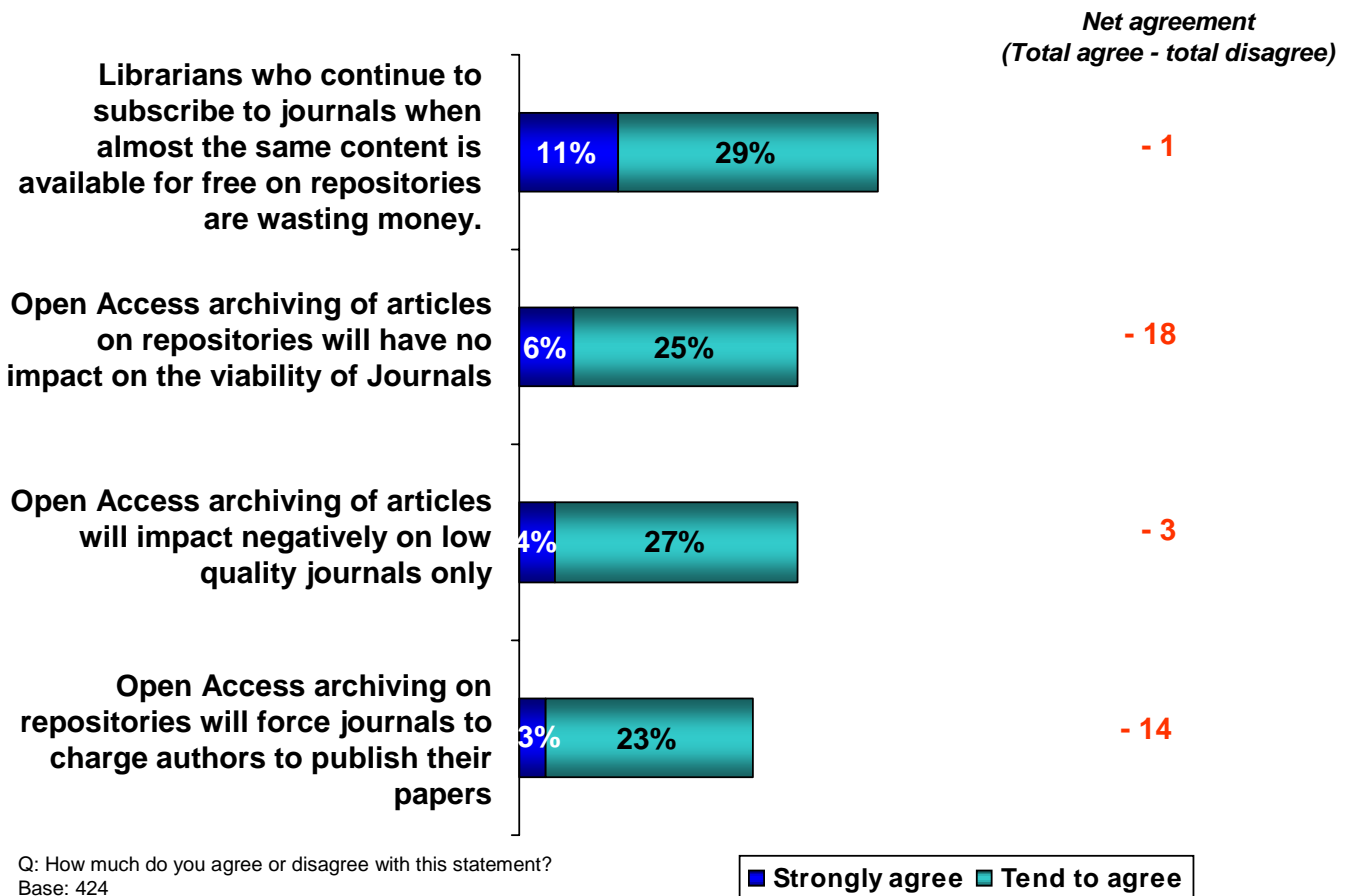


Figure 13 – Attitudinal Study (part 2)

DEMOGRAPHIC VARIATION IN THE ATTITUDINAL SURVEY

In contrast to the similarity between different librarians' views on the relative importance of different attributes tested in the conjoint survey, there are some demographic differences with respect to their attitudes to Open Access.

By region:

- It is within Europe that librarians are more likely to welcome the challenge to traditional publishers (44% strongly agree vs. 29% in North America) and consider the content on Open Access archives to be reliable (52% agree vs. 47% in North America).
- North American librarians show evidence of being more concerned than their European counterparts, about the future of publishers.
- North American librarians are less likely to believe that libraries will cancel (only 31% agree compared to 39% in Europe)
- North American librarians are less likely to believe that Open Access will have no impact on the viability of all journals (29% agree vs. 34% in Europe).

Low base sizes mean that findings in Asia, Australasia and the Rest of World (RoW) are only indicative.

- However, Asia and RoW are more likely to believe that Open Access will have little impact at the same time as believing that libraries are wasting money in continuing to subscribe when content is available for free.
- Australasian librarians are more likely to think that publishers will continue to receive revenues.

By subject area:

- Librarians with a medical subject focus have faith in the reliability of content on Open Access repositories (59% agree) and are less likely to think Open Access will have no impact on the viability of journals (39%).
-but appear more bound to publishers: they don't think publishers should worry about cancellations (48% agree) and are less likely to think libraries are wasting money by continuing to subscribe (34% agree).
- Conversely librarians with a focus on Science are less likely to believe that publishers should not worry (29%) and more likely to believe authors will be forced to pay charges (38%).
- Librarians in Social Science are more likely to say Open Access will only impact on the low quality journals (40%).

By job role:

- **Senior library managers are a little more likely than other types of librarian to believe that Open Access archives are reliable (53%) and that they would be wasting money to subscribe when the content is available for free (46%).**

A SEGMENTATION OF CONTENT BUYERS

A conjoint analysis also allows for the identification of distinct groups of people that perhaps cut across demographic boundaries but nevertheless who share the same needs. These are referred to as 'Needs Based Segments'. In this study, four distinct needs-based segments were identified (*Figure 14*):

34%: Cost-conscious

25%: Version- and Quality-conscious

22%: Extreme quality-conscious

19%: Extreme recency focus with little concern about cost

Needs based Segments

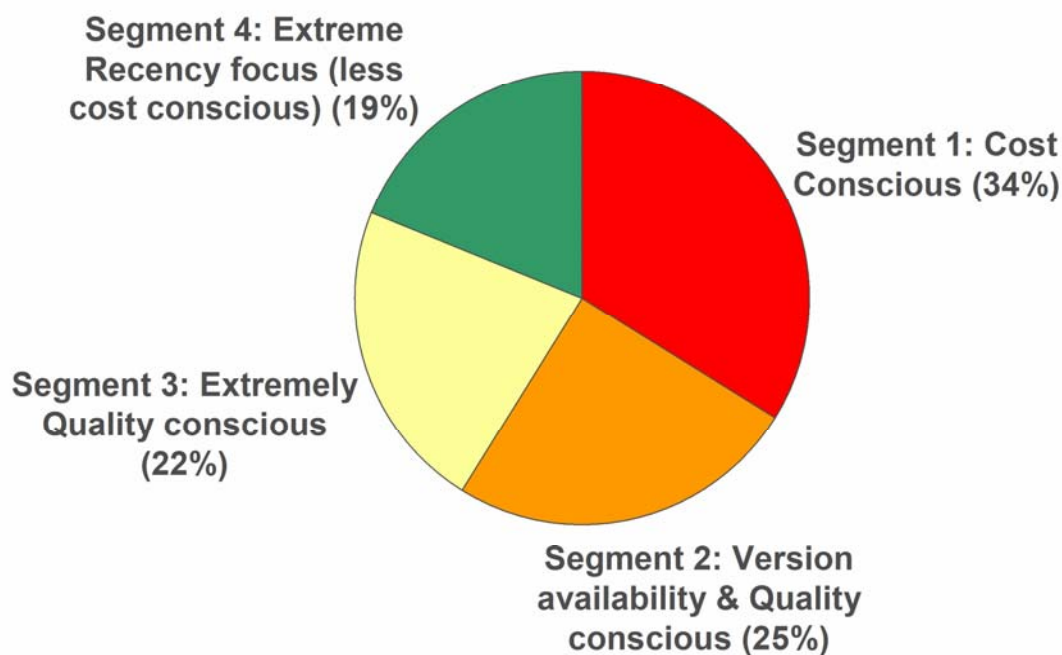


Figure 14 – Needs based segments

Just as with the overall conjoint analysis shown in *Figures 4* and *5*, it is possible to study within each segment the relative pull of each of the other *attributes* and furthermore to work

out the probability of each of the demographic types as belonging to the segment, as discussed below.

Segment (1) – 34% - Cost Conscious

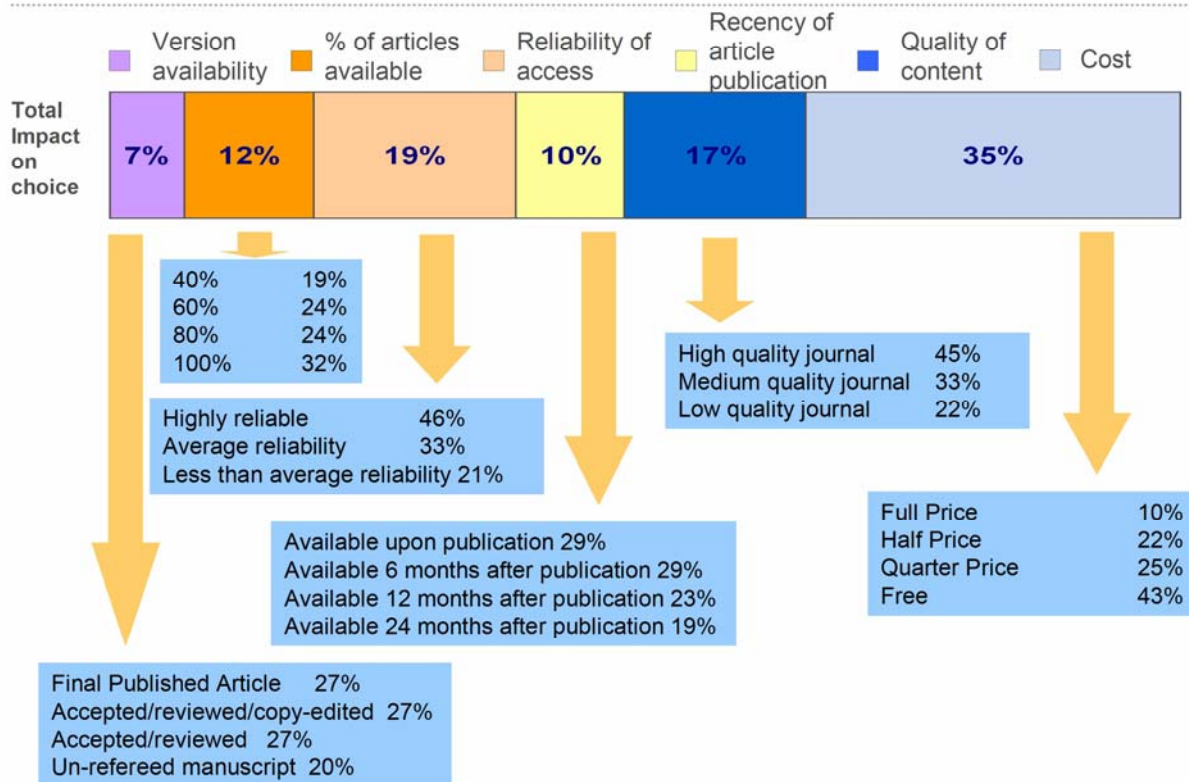


Figure 15 – Cost Conscious Segment

Figure 15 shows how those that are part of the cost-conscious segment typically form their preferences. Of greatest note, perhaps, is that this group also have a need for reliability.

These data are further summarised in *Figure 16*, which overlays the behaviour of this segment of the population with the population overall, as previously shown in *Figure 3*.

Overall Importance from Conjoint Study with overlay for Cost Conscious Segment

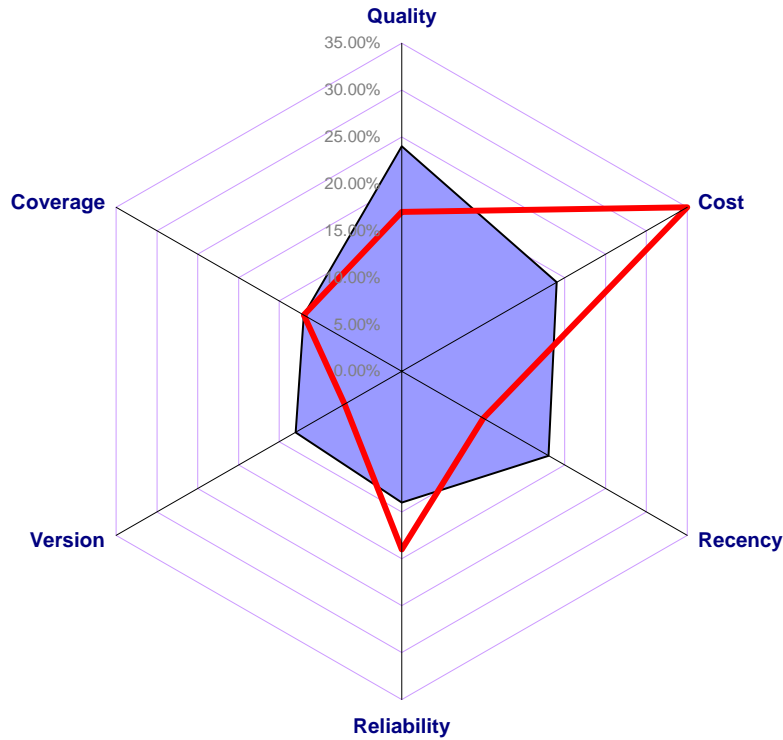


Figure 16 – Overall importance from conjoint survey with overlay for cost-conscious segment (red)

Those that have a strong cost-saving preference also display the need for high reliability of access, but have the same overall need for coverage as the population as a whole.

Such a plot can show marketers how to best match the needs of their products to different market segments. Those who seek the lowest price are much less sensitive to the *Recency* of the data than others, but still expect the same amount of data (*Coverage*) and a higher level of *Reliability* than they perceive other solutions have.

Segment (2) – 25% - Version Availability & Quality Conscious

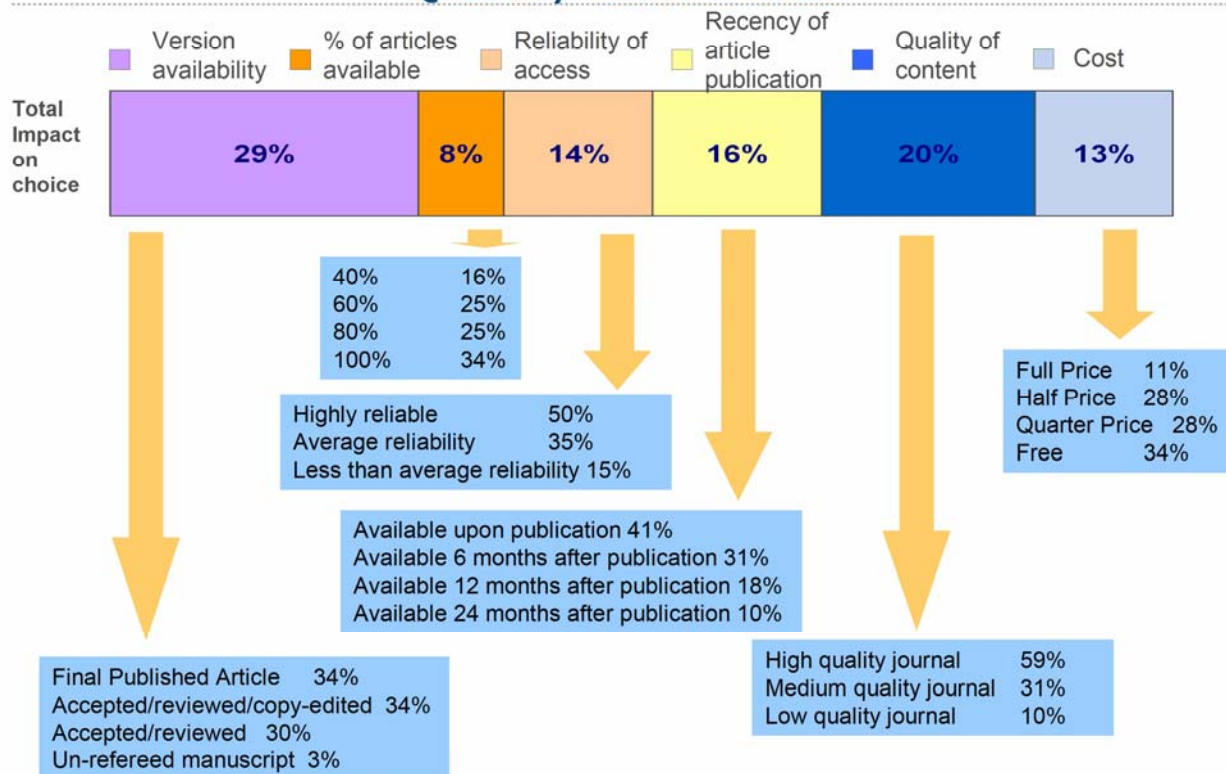


Figure 17 – Version and Quality Conscious needs segment

Figure 17 shows the breakdown for the second segment – those with a strong consciousness for version and quality. Of critical importance here is that this group really will not countenance un-refereed content at all, with only a 3% 'vote'. However, as with the overall population, it is hard to distinguish between all three levels of refereed content and the final published article has no perceived advantage over the accepted, reviewed and copy-edited version. As is summarised in Figure 18, this grouping is slightly less cost conscious than the population as whole.

Overall Importance from Conjoint Study with overlay for Version & Quality Conscious Segment

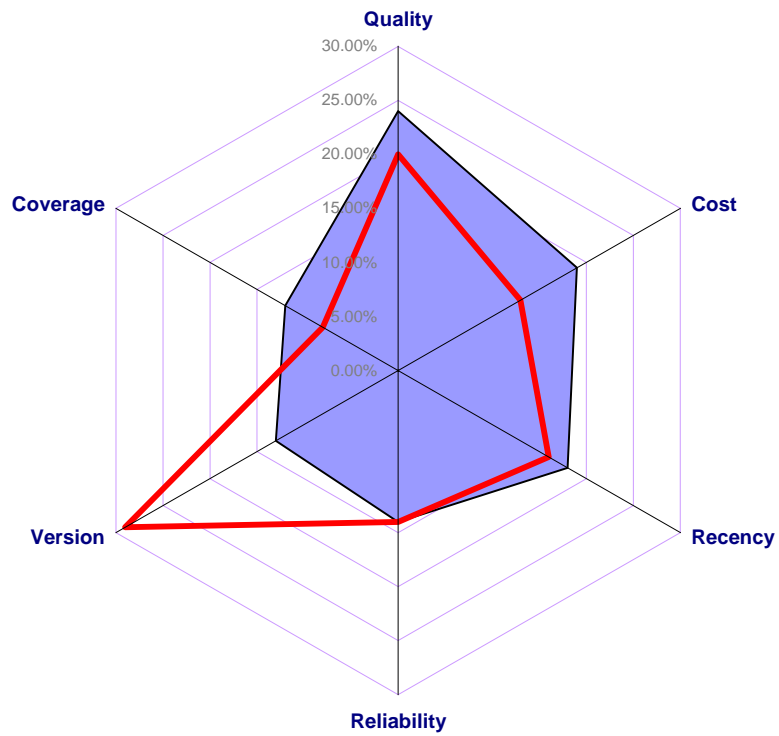


Figure 18 – Those with a strong version preference have a reduced need for lower pricing.

These data are further summarised in *Figure 18* which overlap the behaviour of this sector of the population with the population as a whole, as previously shown in *Figure 3*.

Segment (3) – 22% - Extremely Quality Conscious

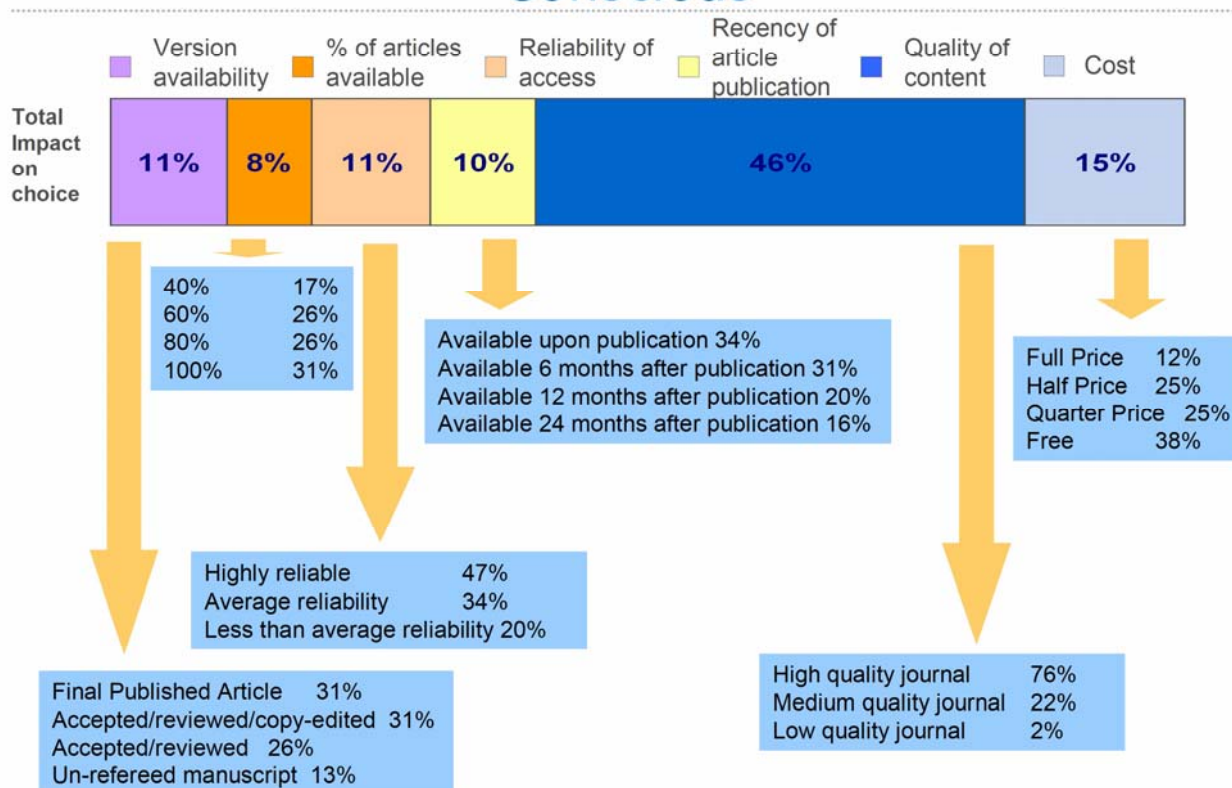


Figure 19 – Segment representing extreme quality consciousness

Figure 19 describes the segment with extreme quality consciousness. In the conjoint survey, this group almost always favoured high quality content over lower quality content, irrespective of other factors, such as price, availability or reliability. There are still clearly a large proportion of librarians who are willing to prioritise high quality content even if that results in pressure on budget and poor availability. In our analysis of preference for each product, we modelled behaviour where the quality of the journal was the same. This enabled us to compare like-for-like scenarios. However, this group would be willing to sacrifice much in order to retain access to the high quality journals. Nevertheless this group represents an interesting data point for marketers since when compared to the population as a whole (*Figure 20*) all the other *attributes* are considered to be significantly less important.

Overall Importance from Conjoint Study with overlay for Extreme Quality Conscious Segment

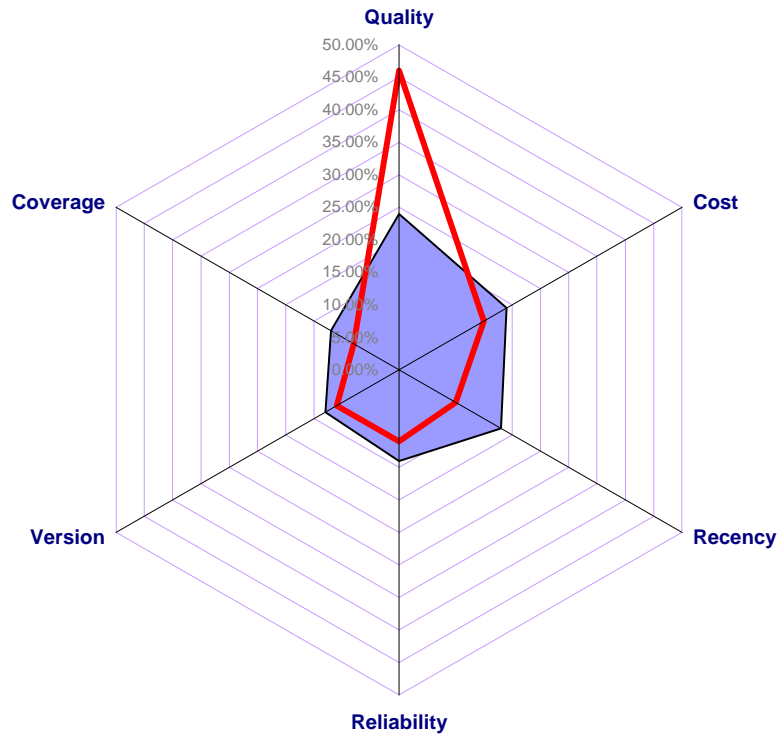


Figure 20 – Those with a strong Quality need have much lower needs for the other attributes.

The summary chart in *Figure 20* shows how this group compares with the entire population.

Segment (4) – 19% - Extreme Recency focus; less cost conscious

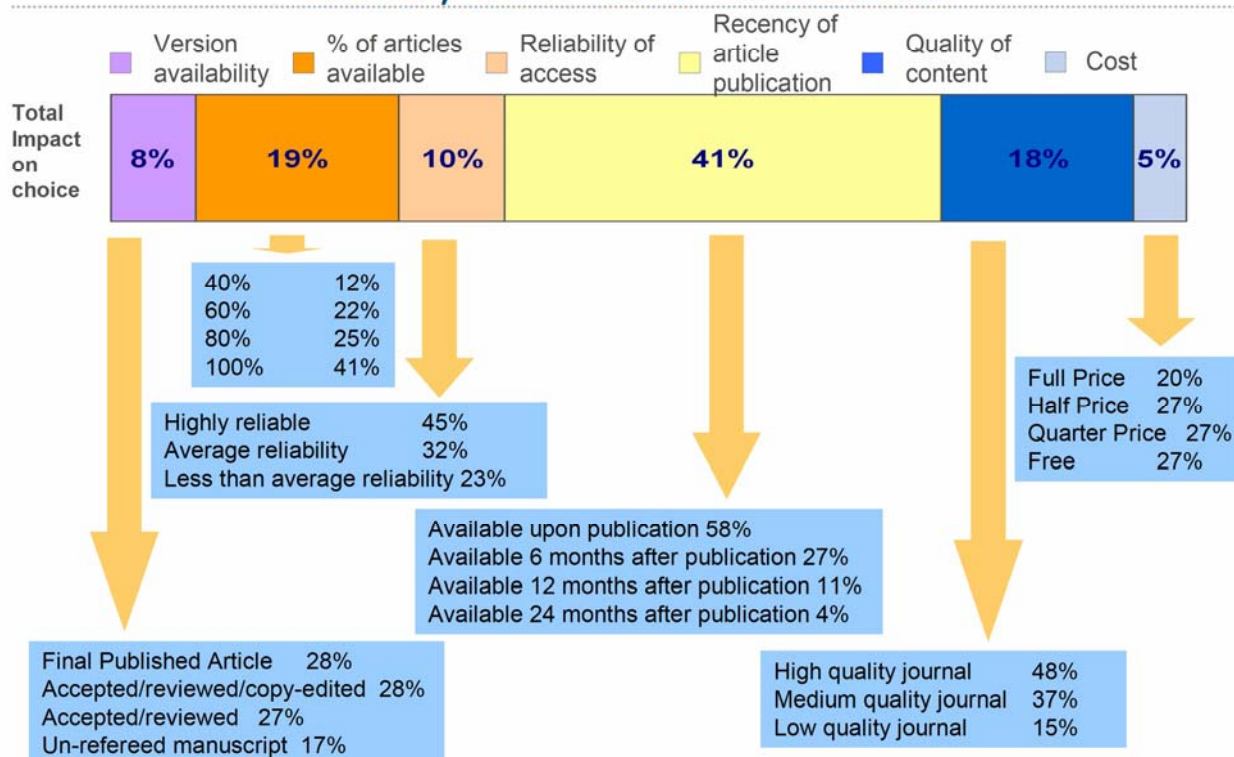


Figure 21 – Segment showing extreme Recency focus

Figure 21 shows the behaviour of a segment of the population whose primary focus is the immediate availability of content. This behaviour is so extreme that it has very little focus on price, and is one of the most relaxed groups with respect to version – for 17% the un-refereed manuscript will do, as long as it is fast!

Overall Importance from Conjoint Study with overlay for Extreme Recency Segment

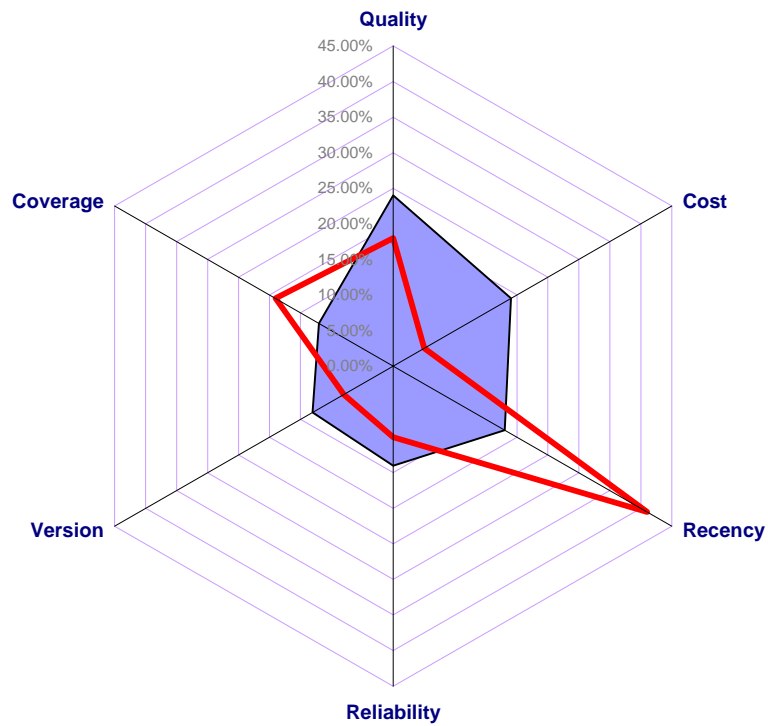


Figure 22 – Those with extreme Recency focus also demand a high coverage level, but have little concern over cost

The summary chart in *Figure 22* shows how this group compares with the entire population. Again, for marketers, these data show a clear opportunity for profit in relation to the rapid delivery of research to the right sectors.

METHOD

INTRODUCTION

The subject of Open Access is an emotive one and so a great part of this research has been conducted into the competing sets of choices that Open Access, licensed databases and subscription journals represent without actually referring to any of these *per se*. Instead librarians were asked to compare in the main body of the conjoint analysis (see below) abstract models of acquisition with no obvious correlation to products (or content packages) available today. After that section was completed they were asked some additional attitudinal questions addressing some of the issues surrounding Open Access.

Invitations to participate in a web-based survey were emailed to a sample of 25,683 emails drawn from a database of PRC customers, SIS contacts and commercially obtained mailing lists. Significant efforts were made to compile the database so that it included the broadest demographic spectrum possible of email addresses of likely decision-makers concerned with journal renewal in libraries around the world.

In order to maximise inclusion in the survey, the email invitations and web-based questionnaire were translated into English, French, Spanish, Portuguese, German, Italian, Japanese, Chinese (Traditional and Simplified), and Korean.

The text of the email invitation appears in the appendix. It was sent by SIS on behalf of the PRC and contained:

- A description of the PRC
- The purpose for the survey and expected time to complete
- A guarantee of respondents' anonymity
- A hyperlink to the survey start
- An opportunity to win \$100 amazon.com vouchers for 3 respondents

On arrival at the web-based questionnaire, respondents were given an option to complete the questionnaire in whichever of the 10 languages they preferred.

They were then presented with a landing page containing a further description of the survey sponsor, purpose, time to complete, guarantee of anonymity and prize draw.

There was one screening question to establish that only respondents with responsibility for negotiation, recommendation or evaluation of electronic journal content completed the questionnaire. All others were screened out and thanked for their interest.

The main questionnaire was designed in co-operation with Scholarly Information Strategies (scholarly publishing consultancy), Kindle Research (market research consultancy) and Logit Research (statistical analysis consultancy), and hosted by Explorandum with translation facilities provided by The Language Factory.

Given that a key objective of the research was to predict the choices that decision-makers would make based on a competing set of alternatives (i.e. acquiring scholarly information from sources other than primary publishers), it was decided to build the questionnaire around a form of conjoint analysis¹⁰ (specifically the latent class, maximum-differential approach). By presenting respondents with a series of possible choice scenarios and asking them to select the one they preferred the most and the one they preferred the least, it is possible to infer the relative importance of different attributes of scholarly content in driving their choice of acquisition. It also enables the creation of a 'share of preference' model that predicts the likely uptake of different scenarios.

Initially a number of factors were identified by SIS that they thought library decision-makers were most likely to consider important when purchasing content for libraries. These were tested and validated by extended (typically 60-90 minute) face to face discussions with six senior decision makers at the MidWinter ALA conference in San Antonio and additional follow-up, open-ended, in-depth interviews by telephone. Following modification, the web-based questionnaire was piloted among a further six respondents [three of whom had participated in the initial definitional phase and three who had not] and the questionnaire finalised. Feedback from this process resulted in a reduction of the attributes to be tested in the conjoint analysis from an original eight¹¹ to six and to some minor rewording of the attitudinal survey.

English invitations were sent on 6 July 2006 and other languages were sent on 26 July. The fieldwork was closed and data exported on 8 August 2006.

A total of 424 completed the questionnaire. This constitutes a response rate of 2.6%

▪ Total emails sent	25,683
▪ Bouncebacks	9,401
▪ Screened out (ineligible)	109
▪ Effective sample size	16,173
▪ Completions	424

For the conjoint model, confidence is based on how well the model predicts correct choices. The model has an R-squared value of 45% which can be considered to be an excellent prediction. It also predicts very well the choices of individual respondents, predicting the correct choice for individuals (i.e. the options they actually chose) 73% of the time. This emphasises that librarians are quite consistent in their selection. For the attitudinal questions, the results have a standard error of ± 4.8 percentage points for results of around 50% at the 95% confidence level (falling to 2.9 percentage points for results of around 10% or 90%).

¹⁰ For a brief free layman's introduction to conjoint analysis see: What is Conjoint analysis at www.dobney.com

¹¹ The two attributes that were include in the original draft conjoint survey but subsequently excluded were "Archive and Permanence" and "Importance to your Collection"

DEMOGRAPHICS

The following charts show the breakdown of respondents by the various demographics measured.

In selecting a sample for the survey, the sample's demographic breakdown by Library Type, Job Role, Library Spend and Library Collection Focus were not available so it is impossible to ascertain whether or not the responses obtained were consistent with the sample.

Regional information was available for about 60% of the 25,000 in the sample. It is unfortunate that, given the likely response rate for such a (relatively complicated) survey, SIS had to use approximately 10,000 email addresses with no regional definition at all. As a consequence it is also inappropriate to calculate to what extent the survey responses were representative of the sample deployed.

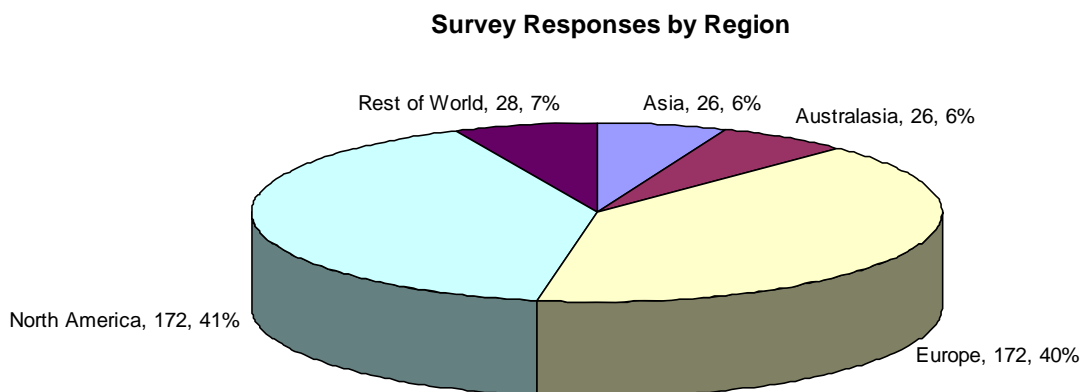


Figure 23 Responses by Region

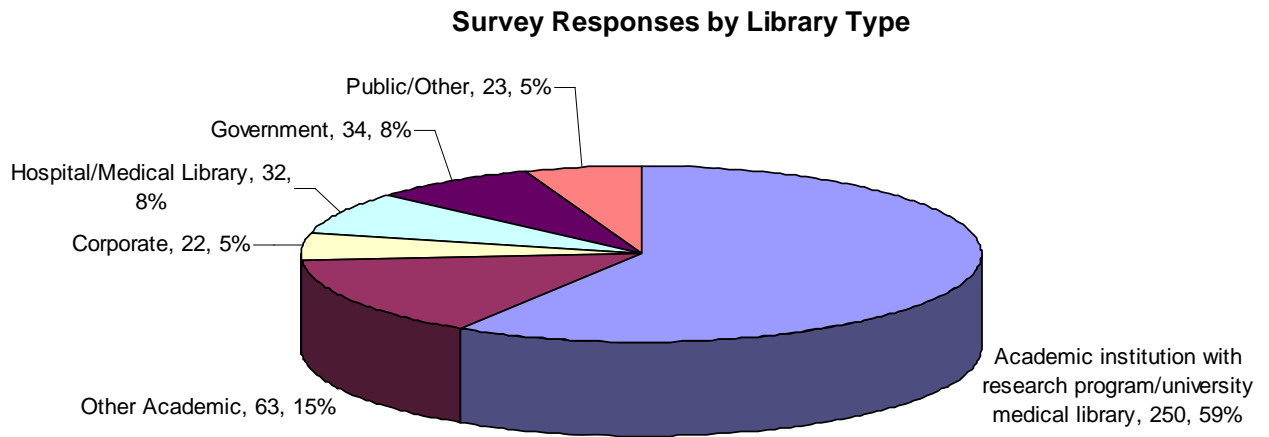


Figure 24 Responses by Library Type

Survey Responses by Job Role

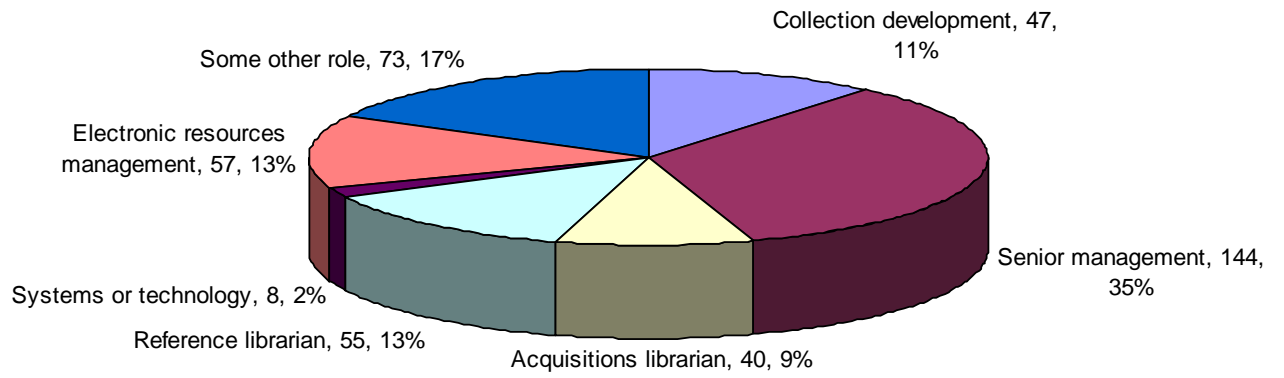


Figure 25 Responses by Job Role

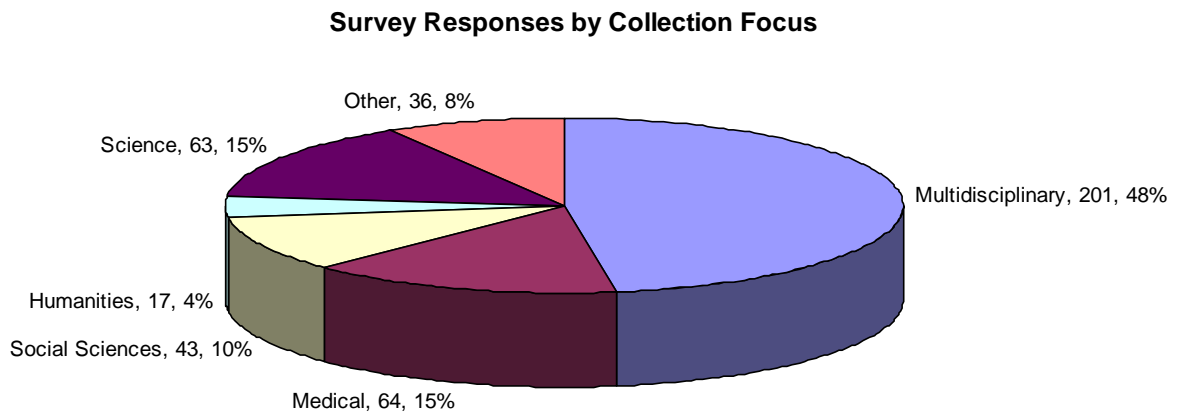


Figure 26 Responses by Collection Focus

Survey Responses by Library Spend in US\$

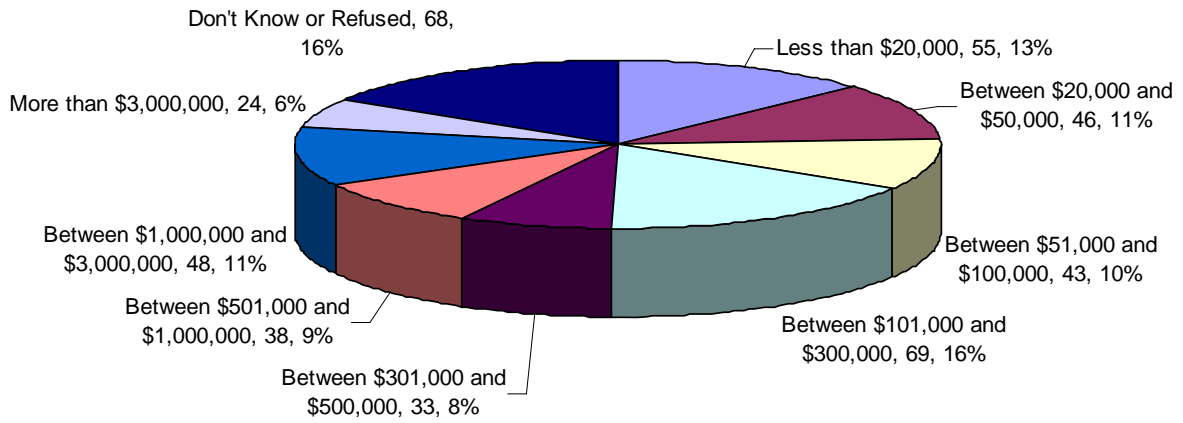


Figure 27 Responses by Library Spend

APPENDICES

A. EMAIL INVITATION TO PARTICIPATE

Subject line: Help us define new ways to deliver content

Dear Colleague,

We are conducting an important international survey among libraries on behalf of the Publishing Research Consortium (PRC) and need your help.

The PRC wants to understand the issues that are most important to you in providing access to the content of research journals

The Publishing Research Consortium is an industry group representing commercial and society publishers that supports global research into scholarly communication, with the aim of providing unbiased data and objective analysis.

We would be extremely grateful if you could complete the survey by clicking on the link below or pasting the address into your browser. It will take about 15 -20 minutes to complete.

<http://LINK TO SURVEY>

Your opinions will help shape publishers' electronic publishing programmes so your participation is extremely valuable.

We guarantee your anonymity in this survey. SIS is an independent research organisation so the PRC will have no means of knowing which answers are received from which participants.

Our privacy policy is also available at: surveys.scholinfo.com

Everyone who takes part in the survey also has the opportunity to win 3 prizes of \$100 worth of Amazon vouchers.

Many thanks

Chris Beckett

Scholarly Information Strategies Limited, Oxford, England

Consultants in Scholarly Publishing to Publishers, Intermediaries and Libraries

Email: chris@scholinfo.com

B. WEB SURVEY INTRODUCTION (LANDING PAGE)

This survey is being undertaken by Scholarly Information Strategies on behalf of the Publishing Research Consortium in order to better understand the different factors that influence your journal renewal decisions.

The survey will take about 15-20 minutes to complete.

Your opinions will help shape publishers' electronic publishing programmes so your participation is extremely valuable.

We guarantee your anonymity in this survey. SIS is an independent research organisation so the PRC will have no means of knowing which answers are received from which participants.

Everyone who takes part in the survey also has the opportunity to win three prizes of \$100 worth of Amazon vouchers.

If you have any difficulties in completing this survey, please contact chris@scholinfo.com.

Click on the CONTINUE button below to start.

C. SCREENER

S1. With respect to the purchase of electronic journal content, which of the following are you responsible for, either on your own or with others? Please tick all those that apply.

Negotiating and or purchasing

Recommending

Evaluating

Training

Using

No involvement

THANK YOU AND CLOSE MESSAGE:

Thank you for undertaking to complete this survey. We are particularly interested in the opinions of people who are responsible for negotiating, purchasing, renewing, recommending or evaluating ejournal content. Your answer indicates that you are not directly involved in these processes, and therefore we would like to simply invite you to enter our prize draw by clicking on the CONTINUE button below. Many thanks for your interest in our survey.

D. MAIN QUESTIONNAIRE

Introduction screen

We will now ask 8 questions.

In each question you will be presented with a table that:

- Lists some of the key factors affecting renewal and collection development decisions.
- Has three columns (A, B and C), each with different values for each of the key factors.

Please review the table and indicate which option A, B or C you prefer **most**, and which option you prefer **least**, using the selection box at the bottom of the page. Some of the options may seem strange, and not the ideal combination you would like. Nevertheless please persist!

There are 8 tables in all.

The key factors are:

Version Availability

Percentage of a journal's articles that are available

Reliability of Access

How up-to-date is the content

Quality of the content

Cost

You can assume for the purposes of this questionnaire that: all content is equally easy to find using library tools and general search engines; all content is relevant to your library; and all content has satisfactory archiving arrangements. We do know these are important factors but they have been deliberately excluded from this exercise.

- I have read the instructions

Sample Question

1 of 8. Review each option - column A, B and C. Please indicate which of these options you prefer most, and which one you prefer least ?

	Option A	Option B	Option C
Version Availability	Final Published Article	Author's copy of the accepted, peer-reviewed and copy-edited article	Author's copy of the un-refereed, original manuscript
Percentage of a journal's articles that are available	80%	100%	60%
Reliability of Access	Less than average reliability	Highly reliable	Average reliability
How up-to-date is the content	Articles are available 12 months after publication	Articles are available upon publication	Articles are available 6 months after publication
Quality of the content	From a medium quality journal	From a high quality journal	From a low quality journal
Cost	Free	Half price (50%)	Quarter price (25%)
Which do you MOST prefer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Which do you LEAST prefer?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

PREVIOUS

CONTINUE

This question was repeated 8 times. In each question, options A-C included randomly distributed levels for each attribute so that a range of different scenarios were presented. The levels for each of the attributes were as follows:

Attributes and their levels.

Version Availability	Final Published Article	Author's copy of the accepted, peer-reviewed and copy-edited article	Author's copy of the accepted, peer-reviewed manuscript	Author's copy of the un-refereed, original manuscript
Percentage of a journal's articles that are available	40%	60%	80%	100%
Reliability of Access	Highly reliable	Average reliability	Less than average reliability	
How up-to-date is the content	Articles are available upon publication	Articles are available 6 months after publication	Articles are available 12 months after publication	Articles are available 24 months after publication
Quality of the content	From a high quality journal	From a medium quality journal	From a low quality journal	
Cost	Full Price (100%)	Half price (50%)	Quarter price (25%)	Free

E Attitudinal Questionnaire

Q. How much do you agree or disagree with each of the following statements?

(Response options: Strongly Agree, Tend to Agree, Neither Agree nor Disagree, Tend to Disagree, Strongly Disagree)

- Open Access archiving of articles on repositories will have no impact on the viability of Journals.
- Open Access archiving of articles will impact negatively on low quality journals only.
- Open Access archiving of articles is a good thing in that it challenges traditional publishers.
- Content on Open Access archives is reliable.
- Publishers should not worry about articles on Open Access repositories – libraries have not cancelled up to now, and they are very unlikely to in the future.
- Open Access archiving on repositories will force journals to charge authors to publish their papers.
- Librarians who continue to subscribe to journals when almost the same content is available for free on repositories are wasting money.

Demographics captured

P1. What type of library do you work in?

- Academic institution with research program/university medical library
- Other Academic
- Corporate
- Hospital/Medical Library
- Government
- Public/Other

P2. What is your country of residence?

[ISO list with US at the top}

P3. What is the predominant collection focus of your library?

- Multidisciplinary
- Medical
- Social Sciences
- Humanities
- Science
- Other

P4. Approximately how much do you spend annually on serials ?

- Less than USD\$20,000
- USD\$20,000-\$50,000
- Between USD\$51,000-\$100,000
- Between USD\$101,000-\$300,000
- Between USD\$301,000-\$500,000
- Between USD\$501,000-\$1,000,000
- Between USD\$1,000,000 and \$3,000,000
- More than USD\$3,000,000
- DK or Refused

P5 What is your job role?

- Collection development
- Senior management
- Acquisitions librarian
- Reference librarian
- Systems or technology
- Electronic resources management
- Some other role

P6. If you would like to be entered in the draw to win one of three \$100 Amazon vouchers, please enter your email here. Your email will only be used for the purposes of the draw and will then be deleted.

BOX FOR EMAIL

THANKS AND CLOSE

REFERENCES

¹ <http://www.soros.org/openaccess/>

² <http://www.openarchives.org/OAI/openarchivesprotocol.html>

³ Open Access Self-Archiving: An introduction. Technical Report, JISC, HEFCE. Swann, Alma. <http://eprints.ecs.soton.ac.uk/11006/>, Date Accessed:21 September 2006

⁴ John Haynes. Head of Business Development, IoP Publishing. "Impact of repositories on publishing: IoP Publishing Case Study.", London 28 November 2005. Joint ALPSP/SSP Seminar Preprint and postprint repositories and their impact on publishing

⁵ Berners-Lee, T., De Roure, D., Harnad, S. and Shadbolt, N. Journal publishing and author self-archiving: Peaceful Co-Existence and Fruitful Collaboration. <http://eprints.ecs.soton.ac.uk/11160/>

⁶ An ALPSP Report on the Impact of Aggregated Databases on Primary Journals in the Academic Library Market and a Review of Publisher Practice. <http://www.alpsp.org/members/alpspreports.htm> [members only]

⁷ Ware, M. ALPSP survey of librarians on factors in journal cancellation. (2006).