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Information Mapping: Effects of text features and reader characteristics on performance and appreciation

In a previous study, no effects were found applying Information Mapping® (IMAP) to a relatively short text. In three new experiments, we investigated whether text length and the presence or absence of typical IMAP format features would influence possible IMAP effects, and if there would be any interaction effects of the application of the IMAP method and reader characteristics. It turned out that when presented with a relatively long text, readers worked more effectively and efficiently with an IMAP version. Adding typical IMAP format features to an otherwise unaltered conventional text did not produce greater effectiveness but did result in greater efficiency and higher appreciation. No interaction effects were found of the respondents' linguistic background and the application of the IMAP method.

Introduction[1]

Suppose you are an information designer, not too experienced yet in the field, and eager to learn about techniques that might be helpful in rewriting often complicated documents with which your clients confront you. Suppose also that one of your colleagues told you

something promising in passing about an approach to structured writing that you have not heard of before, an approach called *Information Mapping*®. And finally suppose that what you have heard sounds so interesting that you want to discover for yourself what Information Mapping is all about: you decide to take a look at the *Information Mapping Inc*. website. What you find there, among other things, is a number of *before and after* examples of documents written in a conventional form and then re-written using the Information Mapping method (henceforth: IMAP). Figure 1 shows one of the after-examples.

Preceding this example and the other ones showing results of the application of IMAP, the IMAP website gives an explicit warning: "Don't mistake the format for the method!" and then: "What you can see is the format – how the information appears on the page. While it is tempting to imitate the format, there is more to Information Mapping than meets the eye. The format is just the finished product, the 'tip of the iceberg'. What you can't see is the method used to create this format: the analysis, the organization, and the appropriate use of presentation modes. Without the method, the format cannot be effective."

More information about the IMAP method can be found on another page on the website, and in a series of paper publications, mainly written by the founder of

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How to Access Voice Mail Messages

Introduction

This topic explains how to access your voice mail messages from within the company.

Before you begin

You will need your four-digit password to access your voice mail messages. If you have forgotten your password, please call the Help Desk at extension 4523.

Procedure

Follow the steps in the table below to access your messages.

Step	Action
1	Dial 9999 to access the voice mail system. **Result**: The system prompts you to enter your extension number.
2	• Enter your four-digit extension number, and • press the # key.
3	• Enter your password, and • press the # key. **Result**: The system tells you how many messages you have.
4	Use the information below to determine your next step. <table><tr><td>**If you want to ...**</td><td>**Then press ...**</td></tr><tr><td>listen to the first message</td><td>12.</td></tr><tr><td>replay the message</td><td>13.</td></tr><tr><td>delete the message</td><td>14.</td></tr><tr><td>forward the message</td><td>• 15, and • the extension to which you want to forward the message.</td></tr><tr><td>reply to the message</td><td>16.</td></tr><tr><td>skip to the next message</td><td>17.</td></tr></table>
5	Are you finished using the voice mail system? • If *yes*, hang up the phone. • If *no*, repeat Step 4 until you are finished.

Figure 1. Example of the IMAP-version of a text, as shown on the website of Information Mapping Inc. Retrieved August 18, 2006, from: http://www.infomap.com/index.cfm/TheMethod/Demos

IMAP, Robert E. Horn. These publications make clear that one of the major characteristics for IMAP is the standardization of the writing procedures that must be followed. Seven basic principles, all applying to information elements called *maps* and *blocks* are distinguished: the principles of *chunking, hierarchy of chunking and labelling, relevance, consistency, labelling, integrated graphics* and *accessible detail* (for definitions and examples of the application of these principles, see Horn, 1969; 1976; 1985). Visitors of the IMAP website and readers of the

available publications will find that IMAP is a strongly prescriptive set of instructions for the analysis, organization, and presentation of information, resulting in a large degree of consistency and in clearly recognizable texts.

But does it work? Do the time and trouble needed to become familiar with the IMAP method result in better documents? And is the format only effective if the IMAP method is followed? The IMAP website might provide a part of the answer. It contains an *Interactive Demo*. By clicking on stopwatches in this demo, visitors can determine the difference between the reading time necessary to find information in a 'typical business document', a prose text with a rather awkward structure, and the reading time needed for an Information Mapping version. If the IMAP version wins, the visitor is shown how much time and money could be saved in his organization. The site suggests that a one-second gain in reading time of this text translates into $2,000 per year for a company with 100 employees. In the unlikely event that the prose version should win, the visitor is congratulated on his or her special reading skill of a non-IMAP text.

Is this demo meant as scientific proof of the benefits of the IMAP method, or is it just an innocent marketing gimmick presented against the background of serious research into the effects of IMAP? Fortunately, the second option seems to be correct. The IMAP website contains a link to a webpage called *Research*, offering the possibility to download a publication entitled *The Information Mapping® Method. 30 Years of Research* (henceforth: Information Mapping, 1999). In this publication a number of effect studies, mostly carried out between 1975 and 1990, are summarized. The conclusion from these studies is that the results support, among other things, improvements in accuracy, reading speed, time to retrieve information and time-on-task (p. 11). This conclusion is in accordance with a number of statements in a research survey published by Horn (1992a), that carries the promising subtitle 'Examining the evidence

of Information Mapping's method of high-performance communication'.

In the introduction section of this survey, Horn summarizes the findings of the evaluation studies to be discussed, and he states that "the [IMAP] method has stood the test of time under the scrutiny of both university and business evaluators". According to the author, results reported in the evaluation studies show "10 to 55% improved retrieval of reference-based tasks, up to 30% decrease in reading time, and overwhelmingly positive user evaluations by managers and technical staff." Unfortunately, not all the studies referred to in Horn (1992a) can be regarded as successful attempts to thoroughly investigate the effects of applying IMAP-principles when rewriting a text. A number of these studies suffer from serious methodological flaws (for a discussion of these shortcomings and references to publications where other authors criticize the research on IMAP on which Horn bases his conclusions, see Jansen, Korzilius, Le Pair & Roest, 2002; 2003). In a response to critical authors such as Hartley (1982) and Fields (1983), Horn (1991) points out that he would agree that "there is less research than we would like", and that he regrets that "neither Hartley nor other researchers have attempted to replicate the amazingly simple research that would convince them [..]." Horn also states that he finds research valuable in guiding enhancements in the IMAP method, but "in the absence of adequate research, we have to make informed judgments." The experiments carried out in the Department of Business Communication of the Radboud University Nijmegen are intended as contributions to the research advocated by Horn and his colleagues.

The first of these experiments, reported in Jansen et al. (2002; 2003), compared three text versions: an original text that had been used in a Dutch company for several years, an IMAP version of the same text, and a version rewritten by an experienced writer who did not work with the IMAP method. Each version was tested by

approximately twenty respondents working for a Dutch company. With regard to effectiveness and efficiency, the results of the various versions did not differ significantly. The judgements that the respondents made were statistically different in one respect: the IMAP text was rated significantly higher than the text rewritten by the experienced writer. However, the respondents did not rate the IMAP text significantly higher than the original text. Variables such as age and years of service at the company had no significant effect on the results. All things considered, this study failed to substantiate the claim that the IMAP method results in texts that lead to improved reader performance.

Factors that may have impeded the success of the IMAP method in this experiment were the relatively brief length of the texts that were used and the respondents' unfamiliarity with using IMAP texts for information retrieval tasks. The limited set of studies that is available on serious empirical research into IMAP texts does not allow us to assess the possible influence of these factors, nor does the available IMAP literature answer the question to which elements a possible effect – or its non-appearance – can be attributed. If an IMAP version of a text produces better reader performance than a conventional version of the same text, which elements are responsible for this improved performance? Is it the content organization of the texts that plays the most important part, or is it the typical IMAP format features that that are the main cause of any possible success? In other words: what is the empirical basis for the claim on the IMAP website that "without the method, the format cannot be effective"? Furthermore, little is known about the influence of reader characteristics on the effects of the IMAP method. For instance, what are the advantages of designing an IMAP version of a text if it is to be used by readers whose native language is not the one in which the text was written? In order to study these issues, three new experiments were performed.

The experiments

Experiment 1 was designed to answer the question whether the IMAP version of a relatively long text (six A4 pages) would produce higher scores on effectiveness, efficiency, and appreciation than a conventional text version of the same length. This experiment was also designed to allow us to answer the question whether respondents familiar with the IMAP method would obtain higher scores than those without any previous IMAP experience.

In experiment 2, we attempted to ascertain which IMAP features (content organization or external design and layout) were responsible for any possible increased effectiveness, efficiency, and appreciation.

In experiment 3, we verified whether the users' origin (native or non-native) and, hence, their diverging linguistic backgrounds would influence their performance with a Dutch-language instructive text that was conventionally structured and designed as compared with its Dutch-language IMAP counterpart.

The dependent variables in the three experiments reported in this study (effectiveness, efficiency, and readers' appreciation) follow the ISO 9211-11 standard, which defines usability as "the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use" (retrieved August 21, from UsabilityNet: http://www.usabilitynet.org/tools/r_international.htm#9241-11)

Experiment 1: the influence of text length and previous experience with the IMAP method

In the study by Jansen et al. (2002, 2003), respondents used relatively short text versions (the original version was three A4 pages), and no statistically significant effects of the IMAP versions were found in terms of effectiveness, efficiency, and appreciation. Respondents

who participated in this earlier experiment with the IMAP version had never worked with the IMAP method before. Since in Jansen et al. (2002, 2003), short texts were used, we wanted to find out whether IMAP texts would produce better reader performance than conventionally designed texts if these texts were longer. We also wished to find out whether the IMAP method would produce better reader performance in respondents who had already had some previous experience with this method than in those who used it for the first time.

In order to be able to answer these questions, we designed an experiment that would allow us to assess both the influence of the kind of text (IMAP versus conventional) and the influence of the presence or absence of previous experience with the IMAP method.

Respondents, text versions, and tasks

Fifty-three 17/18-year-old pre-university sixth-formers, divided into two groups, took part in this experiment at two points in time (see Table 1). With this number, power is .80, effect size (d) is .80 and alpha equals .05 (see e.g. Aron & Aron, 1997; Cohen, 1992). In order to assess the risk that the effects of the different versions of the texts under study would be influenced by disparities in reading proficiency of the groups who were to be using them, the respondents first took a cloze test on another text (about housing benefit applications) in which, in conformity with the common cloze test procedure, every fifth word had been omitted (Alderson, 1979). The results of the cloze test showed that there was no significant difference in reading proficiency between the groups that were involved in this experiment.

For text A, both the original, conventionally structured and designed version and the IMAP version were used. For text B, only the IMAP version was used. Text A was an informative brochure on the Language and Culture Studies (TCS) programme on offer at the Radboud University Nijmegen, the Netherlands. The

brochure dealt with course-related requirements, enrolment procedures, etc. The original brochure ran to six A4 pages. An IMAP version of this text, also running to six A4 pages, was created and authorized by Information Mapping Netherlands.

Text B was an informative brochure on performance grants by the Information Management Group (IBG) dealing with grants for higher education students. The brochure explained the rights and regulations pertaining to such a performance grant. The original brochure was ten A4 pages in length; the IMAP version of this text, also authorized by Information Mapping Netherlands, totalled fourteen A4 pages.

All respondents were asked to carry out information retrieval tasks by answering several open-ended questions pertaining to the contents of the text version they were working on. The time they needed to do so was measured. The respondents were invited to express their evaluation of the text by answering two further questions.

Design

The respondents were divided into two groups (see Table 1). In each group, each respondent carried out tasks in one of the text versions. First, this was the original version of text A for group 1 and its IMAP version for group 2. Once this experiment had been performed and its results had been analysed, we would be in a position to answer the question whether there were any effect

Table 1. Design: groups and text versions at two points in time

	Test 1	Test 2 (two days after test 1)
Group 1 (n=26)	Text A (TCS, conventional)	Text B (IBG, IMAP)
Group 2 (n=27)	Text A (TCS, IMAP)	Text B (IBG, IMAP)

differences between the two versions of text A. Next, two days later, both groups worked with the IMAP version of text B. The respondents in group 2, therefore, engaged with an IMAP text for the second time, whereas the respondents in group 1 had their first encounter with an IMAP text (see Table 1).

Dependent variables

Scores on the following dependent variables were measured:
– effectiveness: defined as the number of correct answers to seven (text A) or six (text B) questions pertaining to information content;
– efficiency: defined as the time needed to answer the questions correctly;
– evaluation: a rating of 1-10, given by respondents (low: 1, high: 10).

T-tests (SPSS version 12) were carried out to establish the degree to which the mean scores of the two groups differed.

Results: the effect of working with longer texts

In order to assess whether, in such relatively long texts, the IMAP version proved to be more user-friendly than the conventional text version (see Table 1, test 1), the results for the two text versions were compared for effectiveness, efficiency, and overall evaluation.

Effectiveness

The respondents who had worked with the IMAP version of text A in the first test scored significantly higher on three out of seven questions than the respondents who had worked with the original text A. The answers on the remaining four questions showed no significant differences. With the mean number of correct answers being 6.4 (SD=0.7), the IMAP version scored significantly

higher than the original text (mean 5.8 correct answers; SD=1.2) on effectiveness (p < .05) (see Table 2).

Efficiency

The IMAP version of text A also proved to be more efficient than the original text. The respondents with the IMAP version required significantly less time for three out of four questions than the group that worked with the original text. For one question, the difference was insignificant. Table 2 shows that total answering time required for the IMAP version was 14.0 minutes (SD=3.5), whereas the group that had worked with the original version needed 20.2 minutes (SD=3.9) to do so (p < .001).

Evaluation of text version

Overall evaluation, expressed by the respondents as a rating (marks out of ten) on the text version with which they had been working, was also more favourable for the IMAP version (M = 7.9, SD = 1.1) than for the original version (M = 6.8, SD = 0.8) (p < .001).

Results: the effect of previous experience with the IMAP method

To verify whether respondents who had worked with the IMAP method before (group 2) obtained higher scores than those for whom the IMAP method was entirely new (group 1), the results of the two groups were compared on the points of effectiveness, efficiency, and overall evaluation (Table 3). Previous experience with the IMAP method – which was a feature of group 2 but not of group 1 – had no effect on any of the dependent variables: there was not a single significant difference between the scores of group 1 and those of group 2 on effectiveness (six questions), efficiency (three questions), or overall evaluation of the text. The total scores are given in Table 3.

Table 2. Effectiveness (mean number of correct answers), efficiency (time required in minutes), and evaluation (rating) of conventional text A versus IMAP version of text A

Dependent Variable	Original text A (n=26)	IMAP version text A (n=27)	t-value (df=51)	Effect size (ϖ^2)
Effectiveness	5.8 (SD=1.2)	6.4 (SD=0.7)	2.49*	.09
Efficiency	20.2 min. (SD=3.9)	14.0 min. (SD=3.5)	5.89***	.39
Evaluation	6.8 (SD=0.8)	7.9 (SD=1.1)	4.05***	.23

Note. * $p < .05$, *** $p < .001$

Table 3. Effectiveness (mean number of correct answers), efficiency (time required in minutes), and evaluation (rating) of IMAP version of text B

Dependent Variable	Group 1 (n=25) no IMAP experience	Group 2 (n=25) previous IMAP experience	t-value (df=48)	Effect size (ϖ^2)
Effectiveness	4.1 (SD=1.1)	4.2 (SD=1.4)	0.45[ns]	0
Efficiency	12.4 minutes (SD=2.4)	11.9 minutes (SD=2.1)	0.69[ns]	0
Evaluation	7.0 (SD=0.8)	7.0 (SD=1.1)	0.15[ns]	0

Note. ns = not significant

Discussion of experiment 1

This experiment shows that application of the IMAP method in a relatively long original text (six A4 pages) had a positive effect. The pre-university sixth-formers worked more effectively and efficiently with the IMAP version than with the conventional text version and also showed a greater overall appreciation for it. If we compare these results with the outcomes of previous research (Jansen et al., 2002; 2003), in which the IMAP method proved to have no effects in the case of a relatively short text, then our results seem to corroborate Horn's (1992b) idea that, in experiments of this kind, it may be hard to demonstrate any effects of IMAP if the texts used are short.

In experiment 1, we found no empirical evidence for effects of previous experience with IMAP texts on the dependent variables. The group that had worked with IMAP two days previously did not obtain scores that

were in any way different from those of the group for whom IMAP was an entirely novel method. Perhaps a once-only encounter with IMAP is too insubstantial to be able to expect to see such effects. This aspect would be a suitable subject for closer examination in a follow-up study.

Experiment 2: the influence of specific IMAP format features

As the reading objectives of an instructive text generally involve performing an act, solving an operating problem, gaining some understanding of the working of an appliance, or acquiring procedures and skills (Maes, Ummelen & Hoeken, 1996, p. 38), 'skimming' (roughly grasping the structure and meaning of a text) and 'scanning' (search-reading to retrieve certain text passages fast) are important reading strategies (Pugh, 1975). The IMAP
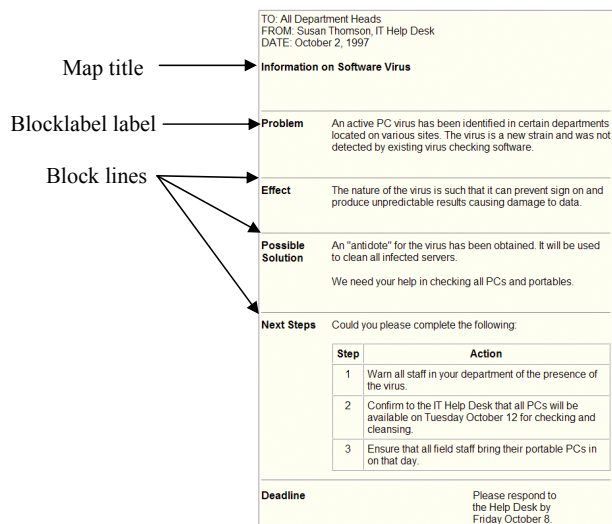
Figure 2. Map title, block labels and block lines in an IMAP document. Retrieved January 15, 2006, from http://www.infomap.com/im_aboutus/method/aboutus_bamemo2.htm

method has partly been designed to facilitate such skimming and scanning operations on a text (for example, see Horn, 1976, 2001). Main IMAP instruments for this purpose include map titles, block labels and block lines (see Figure 2).

Given the external structure and the layout features of an IMAP text, we asked ourselves to what extent these specific format features would influence the effectiveness and the efficiency of a text and the readers' overall evaluation. This question was addressed in two sub-experiments. In sub-experiment 2a, we investigated the effect of removing typical IMAP format and layout features from a version of an instructive text, whose contents had been segmented and organised in conformity with IMAP standards. In sub-experiment 2b, we examined the effect of adding the same specific IMAP format and layout features to an existing conventional text, without altering anything in the content organization of this text.

Respondents, text versions, and tasks

This experiment consisted of two parts. Participants in experiment 2a were 67 staff of Heijmans Beton en Waterbouw (HB&W, a concrete and hydraulic engineering firm) and Waterschap Goeree-Overflakkee (WSGO, a district water board). They included 58 men and 9 women; 15 of them were in the 20-29 age bracket, 19 in the 30-39 age bracket, and 33 were 40 or over; educational backgrounds ranged from intermediate vocational education (25), to higher vocational education (33), or higher education (9). With such numbers, power was .82, effect size was (f=.40) and alpha = .05.

Participants in experiment 2b were 52 arts students from the Radboud University Nijmegen, the Netherlands. They included 13 men and 39 women; their ages ranged between 17 and 25 (M = 20.6; SD = 2.2). In experiment 2b, power is .80, effect size (d) is .80 and alpha equals .05.

In experiment 2a, the HB&W and WSGO staff were divided into three groups (see Table 4). Group 1 (23 respondents) worked with an existing instructive text (length: three A4 pages) on the diving activities of HB&W. Group 2 (22 respondents) worked with an IMAP version of this text (length: five A4 pages), which had been authorized by Information Mapping Netherlands. Group 3 (22 respondents) worked with an IMAP version (length: five A4 pages) that had been stripped of a number of typical IMAP format features:

– the running title ('map title') mentioned on each page had been replaced by a Roman numeral;
– the headings ('block labels') had not been inserted in the left-hand margin but immediately above the section to which they referred;
– the horizontal block lines between blocks of text had been removed, leaving an extra space between the text blocks.

In experiment 2b, the students were divided into two

Table 4. Design: groups and text versions in two sub-experiments

Subexperiment	Group 1 (n=23)	Group 2 (n=22)	Group 3 (n=22)
2a	conventional text HB&W (three A4 pages)	IMAP version (five A4 pages)	IMAP version *without* typical IMAP format features (five A4 pages)
2b	Group A (n=26) conventional text IB Group (four A4 pages) *added* (seven A4 pages)	Group B (n=26) conventional text IB Group, typical IMAP format features	

groups of 26 respondents each. Both groups worked with a text on student grants from the Information Management Group (IB-Groep). Group A worked with an abridged conventional text (length: four A4 pages), and group B worked with the same text to which the above-mentioned IMAP features had been added: the title ('map title') had been inserted on each page, the block labels had been inserted in the left-hand margin, and a horizontal line had been inserted in the extra space separating the text blocks. The length of this text version was seven A4 pages.

The tasks in the two sub-experiments consisted of answering six multiple-choice questions that required the respondents to retrieve specific information. The percentage of correct answers was used as a measure of effectiveness. In answering each question, the time that passed between the respondents starting their search and ticking their answer was noted down. Finally, the respondents gave the text two ratings out of ten: one for retrieval-friendliness and one for the layout.

Results

To establish the effect of the typical IMAP format features on the dependent variables effectiveness, efficiency, and overall text evaluation, we compared the scores obtained with different text versions in the two experiments.

Statistical tests used

To be able to compare the scores of the different groups, analysis of variance and t-tests were performed in SPSS (version 12). If any statistically significant differences were found, we performed post-hoc analyses on the outcomes of experiment 2a – in which three text versions were used – to establish where (between which text versions) the significant difference occurred. Analyses of covariance were performed to determine whether the variables age (in both experiments) and level of education (in experiment 2a) influenced the results.

IMAP version without specific format features compared with conventional text and full IMAP version

None of the three text versions in experiment 2a were more effective than either of the other two (Table 5). However, there were significant differences in efficiency and in overall evaluations of text versions. The post-hoc analysis showed that respondents had worked significantly more efficiently with both IMAP versions than with the conventional version, and that there was no significant difference between the efficiency scores on either IMAP version. With regard to the overall evaluation of the text, post-hoc analysis also showed that both IMAP versions were given a significantly higher rating than the conventional version, and that there was no significant difference between the rating for the full IMAP version and the IMAP version that had been

Table 5. Effectiveness: number of correct answers per text (in %); efficiency: average required time (in seconds); and overall evaluation of text version

Experiment	Dependent Variable	Group 1 (n=23) conventional text	Group 2 (n=22) IMAP text	Group 3 (n=22) IMAP without format features	Test result	Effect size (η^2 / ϖ^2)
2a	Effectiveness	78 (SD=16)	86 (SD=17)	88 (SD=22)	$F(2,64)=2.45^{ns}$	.07
	Efficiency	46.7 (SD=21.7)	30.4 (SD=12.0)	30.9 (SD=13.8)	$F(2,64)=7.20^{**}$	.18
	Overall evaluation	5.1 (SD=1.7)	7.5 (SD=0.9)	7.7 (SD=0.9)	$F(2,64)=30.39^{***}$	.49
2b		**Group A (n=26) conventional text**	**Group B (n=26) conventional text; IMAP format features added**			
	Effectiveness	87 (SD=13)	85 (SD=17)		$t(50)=0.32^{ns}$	0
	Efficiency	43.8 (SD=12.2)	32.4 (SD=10.5)		$t(50)=3.62^{**}$	.21
	Overall evaluation					
	Retrieval-friendliness	6.4 (SD=1.1)	7.3 (SD=0.8)		$t(50)=3.48^{**}$	.20
	Layout	6.5 (SD=1.0)	7.1 (SD=1.1)		$t(50)=2.13^{*}$	.08

Note. ns = not significant, * $p < .05$, ** $p < .01$, *** $p < .001$

stripped of typical IMAP format features. None of the dependent variables, therefore, showed an effect that can be attributed to the deletion or non-deletion of typical IMAP format features. Analyses of covariance showed that neither age nor educational level interacted significantly with the IMAP versions. However, respondents with backgrounds in higher vocational education or higher education did prove to produce a higher average of correct answers than those with a background in intermediate vocational education.

Conventional text compared with text with added IMAP format features

Table 5 shows that the addition of specific IMAP format features in experiment 2b had no effect on the effectiveness of the text. However, the students did work significantly more efficiently with the text version with IMAP format features than with the original text. They also

gave significantly more positive evaluations of the text version with IMAP format features, both in terms of retrieval-friendliness and in terms of text layout. Age as a concomitant variable did not prove to have any influence on the results.

Discussion of experiment 2

The results of experiments 2a and 2b are somewhat heterogeneous as regards the effect of IMAP format features. In experiment 2a, the IMAP version stripped of its format features did not produce a better or worse reader performance than the IMAP version that had retained all its typical format features. Both IMAP versions did obtain higher scores than the original text on efficiency and overall evaluation, but not on effectiveness. In experiment 2b, adding IMAP format features had a positive effect on efficiency and overall evaluation, but, as in 2a, not on effectiveness.

Although the differences between experiments 2a and 2b with respect to design and procedure call for caution, the overall conclusion is clear. The results of 2a contradict the idea that without the typical IMAP-format, organising the content of a text in conformity with IMAP standards cannot be successful, while the results of 2b contradict the idea that without the method, the format cannot be successful. In order to establish the effects of various aspects of content organization and design and layout of IMAP texts in more detail, follow-up research could test IMAP versions in which various aspects of their internal and external structure are varied, separately and in conjunction.

Experiment 3: effects of IMAP on performance of users with different linguistic backgrounds

A survey of research into effects of the IMAP method (Horn, 1992a, pp. 26-27) makes mention of only one study in which the user's linguistic background appears to have been taken into consideration (Grebow & Horn, n.d.). This publication claims that IMAP has a positive effect in non-native speakers. However, besides stating that "the manual worked perfectly from the beginning" and that "the result was greater sales and better service", it provides no further information on how the effectiveness of the IMAP method was actually tested. Nor do Grebow & Horn (n.d.) elucidate whether the group that had poor proficiency in English benefited more, less, or to the same degree from the IMAP method with which the manual had been written as did those staff whose proficiency in English was fine. The question, therefore, is whether non-native speakers might have more to gain from the IMAP texts, which, after all, are meant to be highly transparent and user-friendly. This, therefore, was the object of our third experiment. What are the effects of an IMAP text as compared with a conventionally written text when the readers' native language is different from the language of the text?

Respondents, text versions, and tasks

Seventy-six respondents participated in this experiment. They were employed at the production department of the International Service Centre of Sony Music Entertainment in Haarlem, the Netherlands. Forty-four of them were of Dutch descent (henceforth: 'native'): like themselves, both their parents were born in the Netherlands; their native language was Dutch. The remaining 32 respondents (henceforth: 'non-native') were either themselves born outside the Netherlands or had at least one parent that had not been born in the Netherlands; these respondents' native language was not Dutch. In this non-native group, 23 respondents were of Turkish origin; the others came from Morocco (3) and the Gambia (1), and in 5 cases their country of origin was unknown. Mean educational level of all respondents was relatively low: 10.6 years for the native group (SD=2.8, min.=6. max.=19), and 8.9 years for the non-native group (SD=2.9, min.=5, max.=16). Mean age of the native employees was 42.6 years (SD=7.2), and that of the non-native employees was 41.1 years (SD=7.5). The group of 44 native respondents included 39 men and 5 women, and there were 30 men and 2 women in the non-native group. With these numbers, power is .82, effect size (f) is .40 and alpha equals .05.

In this experiment, four text versions were used, all of which were written in Dutch.

- conventional text A: a one-page instructive text on filling a machine with CD leaflets;
- conventional text B: a one-page instructive text on filling a machine with plastic CD boxes;
- an IMAP version of text A;
- an IMAP version of text B.

Both IMAP versions had been written in line with IMAP standards, contained the same information as the original texts, and had been qualified as genuine IMAP texts by Information Mapping Netherlands. Both in the

Table 6. Experiment Design

| In each group: | 11 native staff | | | |
| | 8 non-native staff | | | |
Point in time	Group 1 (n=19)	Group 2 (n=19)	Group 3 (n=19)	Group 4 (n=19)
1	conventional A	IMAP B	conventional B	IMAP A
2	IMAP B	conventional A	IMAP A	conventional B

Table 7. Effectiveness (mean number of correct answers), efficiency (time required in minutes), and evaluation (rating) of IMAP version

Dependent Variable	Conventional		IMAP		F-value interaction
	native	non-native	native	non-native	
Effectiveness	5.4	4.6	6.0	5.1	$F<1$
Efficiency	3.0	4.1	2.9	3.9	$F<1$
Evaluation	6.4	5.7	7.1	7.0	$F_{(1,74)}=1.32^{ns}$

Note. ns = not significant

original text and in an IMAP version of the other text, each respondent carried out three tasks:

– a production task ("fill the machine ...") with the aid of a scale model of the machine;
– answering two open-ended questions in which specific information on two topics had to be found using the texts;
– expressing their evaluation of the text they had been working with by giving it a rating out of ten.

Table 6 represents the distribution of the four text versions and the sequence – systematically varied over four groups – in which text versions were submitted.

Dependent variables

Scores on the following dependent research variables were measured:

– effectiveness: by way of the number of correctly performed actions (max. 6) plus correctly answered retrieval questions (max. 2);
– efficiency: by way of the time respondents needed for the production task plus the retrieval tasks;
– evaluation: by way of a rating on a ten-point scale.

By means of t-tests in SPSS (version 12), we established the degree to which the mean scores of the two groups differed.

Statistical tests used

To compare the scores of the various groups, MANOVA analyses were performed in SPSS (version 12). In the analyses, the scores of IMAP texts A and B were averaged, as were those of conventional texts A and B. Analyses of covariance were performed to determine whether the variable educational level had any influence on the results.

Results

First, we verified whether there was a main effect of one of the variable text versions (conventional versus IMAP). A major question in this experiment was whether the effect differed for native and non-native readers. In other words, was there an interaction effect between text version and user origin on the dependent variables we investigated? The answer was negative: we found no main effect for text version nor any interaction effect of text version and respondent's origin (see Table 7).

However, there was a main effect of respondent's origin on the variables effectiveness ($F(1,74)=9.49$, $p<.01$) and efficiency ($F(1,72)=12.99$, $p<.01$). The native text users obtained significantly higher scores on number of correct answers and number of correctly executed production tasks: they worked more effectively with the texts. The total time the native text users required to perform the tasks was also significantly shorter than the time required by the non-native text users: the native staff, therefore, worked more efficiently with the texts. This improved reader performance of the native staff was not reflected in higher text appreciation ratings: overall evaluation of native and non-native respondents did not differ significantly. In none of the three analyses did the concomitant variable educational level influence the interaction between text version and user origin.

Discussion of experiment 3

In this experiment, we found no difference between the performance on and evaluation of the IMAP and the conventional text versions in users with relatively lower educational levels and different language backgrounds. The brief texts (one A4 page) investigated here, therefore, did not demonstrate that people whose native language is different from that in which the text has been written are greatly helped if those texts have been made up in line with IMAP method standards.

Follow-up research could demonstrate whether users with native languages different from that of the text do benefit from the internal and external structural features of IMAP versions when longer texts are used. The results of experiments 1 and 2 do point in this direction. A problem with these longer texts, however, might be that the length could be problematic for non-native respondents, regardless of the format in which the texts are presented. However, presenting shorter texts in future research is not necessarily problematic, since

such future research would not be aimed at finding main effects of presentation form, but at interaction effects of presentation form and respondents' origin, which could also occur with shorter texts. The finding that the native employees worked more effectively and efficiently with all submitted Dutch texts than their non-native colleagues is an indication that organizations employing staff with different native languages would do well to make sure that texts used on the job are available in several languages and/or provide further training in the organization's medium of communication for their non-native staff.

Conclusion

In all three experiments, the question whether application of the IMAP method can lead to increased user-friendliness can be answered in the affirmative. At the same time, however, we must observe that a positive effect of the IMAP method cannot be expected to occur in all conditions (see Table 8).

We did find positive effects of IMAP-texts compared to original text versions, but these effects did not occur invariably or always in all respects. Furthermore, it is not yet clear how possible IMAP effects relate to reader characteristics such as gender, cultural and linguistic background, or education. Follow-up research, therefore, is recommended, certainly considering the continued popularity of the IMAP method with many organizations worldwide. Perhaps these organizations should realize that an important claim expressed on the IMAP website is not supported by the results presented in this article. No indications were found that "without the method, the format cannot be effective", and that success can only be guaranteed when both the typical IMAP organization of the content and the typical IMAP format features are applied.[2]

Table 8.   Effects of IMAP text versions in the three experiments

	Exp.		IMAP effects		
			Effectiveness	Efficiency	Evaluation
Length of original text	1	6, 14 A4 pages	✓	✓	✓
	2	3, 4 A4 pages	✗	✓	✓
	3	1 A4 page	✗	✗	✗
IMAP format features	2a	Deleted	✗	✓	✓
	2b	Added	✗	✓	✓
IMAP experience User origin	1		✗	✗	✗
	3	NL is native language	✗	✗	✗
		NL is not native language	✗	✗	✗

✓ = significant effect found

✗ = no significant effect found

Notes

1. Another paper about this study (in Dutch) was published in Le Pair et al. (2006). An earlier paper about the third experiment can be found in Jansen (2002).

2. Well supported advice on a wealth of presentation features that can also contribute to the usability of a document can be found, for instance, in Duffy & Waller (1985), Baecker & Marcus (1990), and Hartley (1994).

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