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RELIABILITY OF THE YESTERDAY FIRST TIME READ METHOD

Up to now in presentations regarding the Yesterday First Time Read method (YFR), attention has especially been paid to validation of the central reach question. Other fundamental aspects of the method have been pushed into the background. In this paper I shall pay attention to one of these items: the statistical margins of the results.

The relevance of this subject is evident. For the YFR method it is particularly important, because in this method the determination of reach is based on a relatively small group of readers – that is, those who read a certain issue yesterday for the first time. Statistical margins can become disproportionately big.

In the YFR method we find – at an equal level of reach – for monthlies lower YFR scores than for weeklies, and for weeklies lower YFR scores than for dailies. So statistical margins for monthlies are bigger than for weeklies and for weeklies bigger than for dailies.

In the Dutch SummoScanner this is for the greater part met by the enormous size of the sample, almost 40,000 respondents per year.

In this paper I shall present the statistical margins for the three media types. Furthermore, I shall indicate which strategies are used to confine margins to a minimum. For easy understanding I shall briefly indicate beforehand what the technique of the YFR method means and how the results are made into reading probabilities.

AVERAGE REACH PER PUBLICATION INTERVAL

In essence the YFR method is a kind of recency research, assuming that in the recency method

reach measurement is based on the determination of reading during the latest publication interval. This can best be explained in several steps.

Suppose we were to determine reach on the basis of yesterday reading, for a group of respondents (panel) of 100 persons. On successive days of the week this could yield the following results:

n=100	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
Yesterday	35	25	15	30	10	15	20	150

This example could be a TV guide, which is consulted regularly during the week. If yesterday reading were to be used as the reach criterion, this would result in 150 reach. Of course, this is not correct, because of the double counting.

In order to avoid double counting, we need to exclude those respondents who have already stated that they had read the magazine prior to yesterday: so we continue with the question whether yesterday was the first time that the magazine was read. This is the essence of the YFR method:

n=100	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
YFR	35	10	0	3	0	1	1	50

It turns out that net 50 respondents read the magazine, which comes to 50% reach.

In a panel we should now have sufficient material at our disposal to calculate probabilities.

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However, in practice no panel is used, but a new sample is drawn every day. The result then looks as follows:

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
n =	100	100	100	100	100	100	100	700
YFR	35	10	0	3	0	1	1	50

You can see that the total YFR score remains equal, for the probability of finding YRF readers on 100 respondents per day is the same when compared with the panel sample.

If we were to calculate reach in the same way (50/700), it would clearly be incorrect. The basis on which reach is calculated, is changed from 100 into 700. *The sample is increased by a factor, which equals the number of interviewing days, in this case seven.* In order to find the correct result, we should multiply the YFR score by seven as well: $7 \times 50 = 350$. If we calculate reach again during the publication interval, we find again the correct 50% ($= 350/700$).

In the Dutch SummoScanner, 125 respondents are interviewed per day. No interviewing takes place on Sundays. On Monday the respondents are asked for their reading behaviour on Saturday and Sunday; the Monday sample might be considered a panel for two days. The number of survey days during the publication interval is six instead of seven; that is why in the Netherlands the YFR score for weeklies is multiplied by six.

For monthlies identical reasoning can be made. On average there are 25 survey days in the pub-

lication interval of a monthly. So for monthlies the YFR score is multiplied by 25.

For dailies (and for television blocks too) the special situation occurs that the publication interval is one day.

Consistently, with regard to dailies, people should be asked both for their yesterday reading and yesterday first time reading behaviour, and the results of the second question should be multiplied by one. For convenience sake we start from the principle that the life cycle of a daily covers one day and even if people read it for more than one day, then a new copy is already published and read for the first time. In other words, yesterday reading and yesterday first time reading are regarded as equal results. That is why the yesterday first time read question is not asked for dailies. I wonder whether this principle is right. There might be an over-estimation of the reach of dailies.

For television it applies in general that each programme can be watched only once, so that it is correct that yesterday watching is put on a level with yesterday first time watching.

**CALCULATION OF READING
PROBABILITY**

Calculation of reading probabilities follows a similar path to that taken in other recency research. In principle the reading probability is the quotient of the readers in the latest publication interval on the one hand and the total number of readers on the other hand. Following the tables above, we present a calculation example in Table 1.

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Table 1

n = 700	Mon n = 100	Tue n = 100	Wed n = 100	Thur n = 100	Fri n = 100	Sat n = 100	Sun n = 100	Total n = 700
Ever readers	60	60	60	60	60	60	60	420
YFR	35	10	0	3	0	1	1	50
YFR x 7	245	70	0	21	0	7	7	350
Reading probability								0.83

As we have seen already, we find an average reach of 350 persons. The total reach consists of 420 respondents. Consequently, all these readers have an average probability of $350/420 = 0.83$ for a contact during a publication interval.

If we use this reading probability again for calculation of average reach, then of course 350 respondents are found again, which is the result of 420 readers with reading probability 0.83.

In this context an important nuance is the fact that this procedure is executed in segments. These segments have been chosen in such a way that the differentiation is reasonably connected with the reading behaviour. In the SummoScanner the segments are based primarily on the answers to the frequency question. The frequency question determines how many of the last six numbers were read. Inclusive of the zero-category we have seven frequency-classes at our disposal. Apart from the monthlies, reading probabilities are also calculated separately for men and women. In total this yields 14 segments.

The SummoScanner is reported per quarter of a year. However, reading probabilities are calculated on the latest, rolling year and then used in the quarter in question.

Now we have sufficient information at our disposal to calculate the statistical margins.

STATISTICAL MARGINS

We use the following formula in order to calculate sample margins:

$$Sc = \pm 1.96 \sqrt{\frac{Pq}{n}} \times \sqrt{\frac{N-n}{N-1}}$$

In this formula:

Se is the statistical margin
p is the probability of the phenomenon to be studied
q is the complement of *p*, so $1 - p$
n is the sample size
N is the population size.

The formula is based on a reliability of 95%.

The last component of the formula is a correction factor for situations in which the sample is a relatively big part of the population. Normally this factor is about 1. However, its value is of importance if you have to work with subsamples. In fact, the YFR question is only asked if the ever read question is answered with 'yes'. So we have to consider the YFR score as a result within the subsample of the yesterday readers.

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On the basis of the formula, we start to calculate the statistical margins of reach on a quarterly basis, for reporting takes place quarterly. In each case we assume that average reach is 10% and total reach 30% (ever reading). All examples are a reflection of the reality in the Dutch SummoScanner.

Dailies

In a quarter about 9,800 respondents are interviewed. The reach of dailies is directly derived from the answer to the yesterday reading question: 10% reach is realised if 980 respondents claim to have read that daily yesterday. In our example we assume that 30% of the respondents claim to have read the daily ever; 2,940 respondents in total, therefore. Now it is possible to calculate the statistical margin. For the two groups of readers the margins are shown in Table 2.

At a sample size of 9,800 and an observation of 30% (ever reading) we can calculate with the formula a margin of 0.91% or 89 persons. The relative margin is the margin (89) divided by the observation (2,940), which yields 3% in this case. This means that the number of respondents who ever read the paper can lie between 2,851 and 3,029 (Table 2).

Yesterday readers are regarded as part of the subsample of ever readers. So in this case $N = 2,940$ and $n = 980$. We find as a result a mar-

gin of 1.39% on 33.3%, which corresponds to 41 respondents. So, with 95% reliability, yesterday reading lies between 939 and 1,021 respondents.

Now we can calculate the reading probability for the extreme cases. The reading probability is calculated by the division of the yesterday readers by the ever readers. For the determinations of extreme reading probabilities we use the situations in which both variables show maximum respectively minimum scores. (A combination of maximum and minimum scores gives equal or smaller margins.) Below we see the results:

Average reading probability: $980/2,940 = 0.33$
 Maximum reading probability: $1,021/3,029 = 0.34$
 Minimum reading probability: $939/2,851 = 0.33$

On the basis of these reading probabilities it is possible now to calculate the different levels of reach. Reach is determined by multiplying the number of (ever) readers by the reading probability. Of course, when using the maximum reading probability we use the maximum number of ever readers and at the minimum reading probability we use the minimum number of readers.

Average reach: $2,940 \times 0.33 = 980 = 10.0\%$
 Maximum reach: $3,029 \times 0.34 = 1,038 = 10.4\%$
 Minimum reach: $2,851 \times 0.33 = 922 = 9.6\%$

The result of this multiplication equals the score of yesterday reading, which is by definition the average reach for a daily. Consequently, for the average reach we find a relative margin of 4% as well.

One may wonder why we have not just used the margin of the yesterday readers. This will be clear in later paragraphs, when the calculation of the probability has another basis than the computation of reach.

Table 2

Daily Newspaper

	Sample	Readers		Margin			Reach	
		no	%	%	no	rel	max	min
Ever readers	9,800	2,940	30.0	0.91	89	3%	3,029	2,851
Yesterday	2,940	980	33.3	1.39	41	4%	1,021	939

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Weeklies and monthlies

Just as for dailies, we can make these calculations for weeklies and monthlies. In these groups of magazines margins change because of the relatively small score on YFR and the multiplication by, respectively, factors of six and 25.

The next table concerns a weekly. We take again an average reach of 10% and a total reach of 30% (Table 3).

In this table for a weekly we see that the margin for 163 YFR readers (within the subsample of 2,940 ever readers) amounts to 24 readers. After multiplication by 6 (the number of survey days), this results in 980 readers in the publication interval with a margin of 142. If we use these numbers, as we did for the daily, in order to calculate reading probabilities and reach, then reach fluctuates between 8.6% and 11.4%, which means a relative margin of 14%. For monthlies this margin is even bigger.

In this case the result is 39 YFR readers per quarter. On this basis we calculate a reach between 6.9% and 13.1%, which means a relative margin of 31% (Table 4).

Table 3

Weekly magazine

Sample = 9,800	Readers number	Margin		Reach	
		number	%	max	min
Ever readers	2,940	89	3	3,029	2,851
YFR	163	24	14	187	140
YFR x 6	980	142	14	1,122	838
Probability	0.333	0.037	11	0.370	294
Reach abs.	980	142	14	1,122	838
Reach %	10.0	1.4	14	11.4	8.6

Table 4

Monthly magazine

Sample = 9,800	Readers number	Margin		Reach	
		number	%	max	min
Ever readers	2,940	89	3	3,029	2,851
YFR	39	12	31	51	27
YFR x 25	980	303	31	1,283	677
Probability	0.333	0.090	27	0.424	0.238
Reach abs.	980	303	31	1,283	677
Reach %	10.0	3.1	31	13.1	6.9

Segments

In reality, the calculation of the reading probability is, as said before, executed in 14 segments. Per segment the sample sizes are much smaller and so the margins are bigger. Within the segments problems may occur, because purely on the basis of sample margins reading probabilities might arise which are bigger than 1.00. Theoretically this is impossible, so corrections have to be made.

As the segments have complete connection (a relatively high scoring segment is always accompanied by a relatively low scoring segment) calculation of the margin of reach becomes an extremely complicated matter. We confine ourselves to the formulae described above, which form a reasonable approach.

It is clear that measures should be taken to limit the margins, especially for weeklies and monthlies. For this two strategies have been developed:

(a) calculating reading probabilities on a year's basis

(b) calculating reading probabilities on group level We shall work out both strategies arithmetically again.

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**FIRST REDUCTION STRATEGY:
EXPANSION TO A YEAR**

By calculating reading probabilities on a year's basis, all sample sizes should in fact be multiplied by four. This reduces the statistical margin. For dailies this gives the view shown in Table 5.

On a year's basis the statistical margin for dailies is 4%, whereas this was 5% on a quarter basis. So although the margin for the reading probability is halved, little is gained. In the quarterly report the margin of ever reading should again be used for calculation, which means a margin for the reach figures of at least 3%. But what are the year's results for weeklies and monthlies?(Tables 6 and 7).

In these examples we see that even on a year's basis, YFR for a reasonably extensive magazine (average reach 10%) can be reported only by a small number of respondents. For the weekly YFR score is 653 respondents on more than 39,000 respondents, for the monthly it is only 157 respondents who indicate during a year of survey that they read the magazine in question yesterday for the first time.

Table 5

1 Daily - 4 Quarters

Sample = 39,200	Readers number	Margin number	Margin %	Reach	
				max	min
Ever readers	11,760	178	2	11,938	11,582
Yesterday	3,920	82	2	4,002	3,838
Probability	0.333	0.002	1	0.335	0.331
Per vehicle per quarter:					
Ever readers	2,940	89	3	3,029	2,851
Reach abs.	980	35	4	1,015	945
Reach %	10.0	0.4	4	10.4	9.6

This leads to the situation that on a year's basis, reach of the weekly, purely on statistical grounds, may vary from 9.1% to 10.9% and of the monthly from 8.3% to 11.7%. This is a relative margin of respectively 9% and 17%. Though this is quite some improvement in comparison with the calculation on a quarterly basis, margins are still too big.

Table 6

1 Weekly - 4 Quarters

Sample = 39,200	Readers number	Margin number	Margin %	Reach	
				max	min
Ever readers	11,760	178	2	11,938	11,582
YFR	653	47	7	701	606
YFR x 6	3,920	284	7	4,204	3,636
Probability	0.333	0.019	6	0.352	0.314
Per vehicle per quarter:					
Ever readers	2,940	89	3	3,029	2,851
Reach abs.	980	87	9	1,067	895
Reach %	10.0	0.9	9	10.9	9.1

Table 7

1 Monthly - 4 Quarters

Sample = 39,200	Readers number	Margin number	Margin %	Reach	
				max	min
Ever readers	11,760	178	2	11,938	11,582
YFR	157	24	15	188	133
YFR x 25	3,920	605	15	4,525	3,315
Per vehicle per quarter:					
Probability	0.333	0.046	14	0.379	0.286
Ever readers	2,940	89	3	3,029	2,851
Reach abs.	980	168	17	1,148	816
Reach %	10.0	1.7	17	11.7	8.3

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SECOND REDUCTION STRATEGY: GROUP LEVEL

That is the reason why a second strategy is used for reduction of the margins, viz. combining several magazines: reading probabilities are calculated on a group level. This is done both for monthlies and weeklies, and for dailies as well. More or less homogeneous groups are formed.

We shall work this out arithmetically too. All numbers of readers, based on the sample of a year, are multiplied by the number of magazines in a group. In practice the number of magazines that are grouped together varies. Monthlies (about 30) are combined all together, regional newspapers (about 30) as well, but in other cases the groups are smaller.

For six national newspapers the results are as in Table 8.

For these daily newspapers we see that the only margin left is caused by the margin of ever readers. The margin of the reading probability draws near 0.

For 30 regional daily newspapers the following computation can be made. We take as basis the more realistic situation in which the average reach is 1% per vehicle and total reach 3%:

Here again we see that the margin in the probability draws near 0, but the margin of the average reach is increased, because the ever readers per quarter per vehicle is relatively small. This results, in spite of the mentioned strategies, in a margin of 11% for the reach figures (Table 9).

For 6 weeklies and 30 monthlies the results are shown in Table 10 and 11.

So we may conclude that for national newspapers a relative margin of 3% per vehicle on an average should be kept, for regional newspapers 11%, for the six weeklies 5% and for

Table 8

6 National daily newspapers - 4 Quarters

n = 235,200	Readers number	Margin		Reach	
		number	%	max	min
Ever readers	70,560	436	1	70,996	70,124
Yesterday	23,520	200	1	23,720	23,320
Probability	0.333	0.001	0	0.334	0.333

Per vehicle per quarter:

Ever readers	2,940	89	3	3,029	2,851
Reach abs.	980	32	3	1012	948
Reach %	10.0	0.3	3	10.3	9.7

Table 9

30 Regional daily newspapers - 4 Quarters

n = 1,176,000	Readers number	Margin		Reach	
		number	%	max	min
Ever readers	35,280	363	1	3,5643	34,917
Yesterday	11,760	142	1	11,902	11,618
Probability	0.333	0.001	0	0.334	0.333

Per vehicle per quarter:

Ever readers	294	33	11	327	261
Reach abs.	98	11	11	109	87
Reach %	1.0	0.11	11	1.11	0.89

Table 10

6 Weeklies - 4 Quarters

n = 235,200	Readers number	Margin		Reach	
		number	%	max	min
Ever readers	70,560	436	1	70,996	70,124
YFR	3,920	116	3	4,036	3,804
YFR x 6	23,520	695	3	24,215	22,825
Probability	0.333	0.008	2	0.341	0.325

Per vehicle per quarter:

Ever readers	2,940	89	3	3,029	2,851
Reach abs.	980	53	5	1,033	928
Reach %	10.0	0.5	5	10.5	9.5

Table 11

30 Monthlies - 4 Quarters

n = 1,176,000	Readers number	Margin		Reach	
		number	%	max	min
Ever readers	352,800	974	0	353,774	351,826
YFR	4,704	133	3	4,837	4,571
YFR x 25	117,600	3,316	3	120,916	114,284
Probability	0.333	0.008	3	0.342	0.325
Per vehicle per quarter:					
Ever readers	2,940	89	3	3,029	2,851
Reach abs.	980	55	6	1,035	926
Reach %	10.0	0.6	6	10.6	9.5

the 30 monthlies a margin of 6%. These are more acceptable limits. Only the regional newspapers are an exception with a margin of 11%, but this group will always have to take a big margin into account, because sample sizes in national surveys are low by definition.

SUMMARY AND EVALUATION

In the Yesterday First Time Read method, reach measurement takes place on the basis of the number of respondents who claim to have read a magazine yesterday for the first time. For weeklies and especially for monthlies this number is small. In order to limit the statistical margins huge samples are used. Nevertheless on a quarter level margins remain too big to base a report on.

As reach is calculated by multiplication of ever readers and their reading probabilities, the statistical margin consists of two components

- (a) The margin of the number of ever readers (= total reach)
- (b) The margin of the reading probability.

Margin of the number of readers

The margin of the number of readers is in fact a component that is independent of the method of media research. In the YFR method as described above, it applies for all medium types that the statistical margin of the number of readers exceeds more or less the margin of the reading probability. Therefore, it is always important to construct schedules on the basis of samples as big as possible. As people often construct schedules based on (target group) selections, it is clear that it results in such big margins that no reasonable magazine selection is possible.

Margin of the reading probability

The minimalisation of the margins of reading probabilities is achieved through two strategies:

- (1) Calculation of reading probability on the basis of year's samples, and
- (2) Calculation of reading probabilities for (homogeneous) groups of magazines. As a result the margins of reading probabilities draw near 0% (0%-3%). This is a very acceptable level. An extra but necessary gain is that the margins are about equal for the various medium types.

It may be clear that this reduction of margins has disadvantages. In the first strategy, calculation of reading probabilities on a year's basis means that older data are combined with the latest data from the last quarter. In the reading probabilities the influence of season has disappeared. The influence of season can be seen only at the differences in the frequency question.

In the second strategy, calculation of reading probabilities at group level, smoothing occurs as well, namely over the various magazines.

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Magazines with a high reading probability are averaged by magazines with a lower reading probability.

As both strategies are used in practice, the smoothings are working at the same time. The result is a reasonable stability of the reach

figures. The validity of the survey results is decreased but, however, the reliability is increased.

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