

REACH & FREQUENCY – Some Questions Answered

Foreword

This document provides examples of expected variations in Reach and Frequency estimates that may be observed either within the cumulative reach of a single schedule, or when similar schedules are compared.

In explaining how these examples occur, key concepts of sampling variance, general principles of estimation and specific algorithms within the Reach and Frequency estimation procedures are discussed.

These Reach and Frequency estimation procedures reflect recognised principles for audience measurement and statistics and are more complex than they would otherwise be because of variation in the sample data.

The fact that these expected variations in estimates are observed in Reach and Frequency estimations is not new and is recognised internationally.

It may be suggested that there can be a mathematical formula or an algorithm which can fix, remove or hide these expected variations. At this point no such fix is known. But there is also an argument that no such fix can be developed. There is an unavoidable problem in estimating reach when each of the respondents' weights change.

The calculation procedures in the OzTAM Gold Standard aim to generate the best possible estimate. This is a widely adopted approach in audience measurement and in statistical estimation more generally.

Introduction

The OzTAM Reach and Frequency calculations are performed in a standard way to provide consistent results across different analysis software, used in the market.

Any Reach and Frequency calculation procedure is attempting to describe the behaviour, over time, of a sample of respondents and their media consumption. In reality, panel surveys rarely provide a completely continuous sample. While panel based audience measurements provide considerable continuity, day to day variations in the sample are still inevitable due to households being added or dropped or not intab.

These day to day panel variations influence Reach and Frequency estimates.

This document gives examples and explanations of the following expected variations in the estimates:-

- Total Reach
- Incremental Reach
- Reach Percentage Results and
- 2+, 3+, ...n+ Reach Declining within a Schedule.

The fact that these expected variations in estimates are observed in Reach and Frequency estimations is not new and is recognised internationally.

The calculation procedures in the OzTAM Gold Standard aim to generate the best possible estimate for the specified schedule being processed. For example, if you re-specify a schedule to include extra days of data, then the procedure completely recalculates the results for that schedule. A new best estimate is calculated using all the data involved in the re-specified schedule.

This is a widely adopted approach in audience measurement and in statistical estimation more generally.

SAMPLING VARIANCE FURTHER EXPLAINED

The day to day changes in the sample will impact on Reach and Frequency calculations, and there are several ways in which the sample changes.

If spots are added to a schedule, bringing in a new day:

- Some people will continue be available for reporting for that new day;
- Some people will become available for reporting and
- Some people will no longer be available for reporting.

If one adds or removes days from a schedule specification:

1. The sample will vary
2. The average weight for each person involved in the analysis will vary
3. If the schedule being evaluated is for a target audience with a floating UE, then the schedule UE will vary

The universe estimate (UE) for the target audience in a Reach and Frequency schedule can be either "fixed"; that is it does not change from day to day or "floating".

Within OzTAM data, key industry population segments are set to fixed UEs. Other population segments are not directly set and will have small day to day variations in their sum of weights, leading to floating universe estimates, that is they change from day to day.

The impact of sampling variance is also affected by the size of the sample available for reporting over the duration of the schedule and the extent to which the reporting sample varies on a day to day basis.

The smaller the sample base for a target audience, the more variable the results will be.

A small average daily sample may exaggerate the impact of respondents moving in and out of the sample. For a target audience with a much larger sample the impact would still exist, but to a lesser degree.

Reach and Frequency estimates are based on a sample of people. An advertising schedule is based on particular days, and for each of those days, there is a sample of people who are available to contribute their data. From day to day the reporting sample will be similar but not identical. The variations in the day to day samples will affect a person's average weight and also impact target audiences with floating UEs.

Additionally, each respondent is given a unique weight for each day that they are available for reporting (intab). The weights are used in surveys to adjust and project the sample to the population. The weights vary for each respondent from day to day because the structure of the sample available for reporting varies.

Common questions:

1. Total ReachPage 5

"Why, when I add a spot to a schedule, can the estimate of the total reach decline?"

2. Incremental ReachPage 6

"How can an extra spot deliver more incremental reach than viewers for that spot?"

3. Reach Percentage ResultsPage 7

"The cumulative reach in thousands up to a particular spot does not change when the schedule is extended, so why do the percentage reach results change?"

4. 2+, 3+, ...n+ Reach Declines within a SchedulePage 8

"Why can the 2+, 3+, ...n+ reach estimate declines at certain spots within a schedule?"

Total Reach

Q 1. "Why, when I add a spot to a schedule, can the estimate of the total reach decline?"

The actual total reach for a schedule would stay the same or increase if one were to add a spot to the schedule. But, the Reach and Frequency estimation procedure (used to estimate an actual value) may result in the estimated total reach declining in a schedule with an additional spot. The addition of a spot introduces new information, thus a new best estimate on this updated schedule is derived.

An example:

Consider a schedule containing four spots listed below, the estimated total reach is 42,416. If we create a second separate schedule which is the same but with an additional spot, the new estimated total reach is 41,355. (i.e. slightly lower than the estimate based on a schedule containing the first four spots only.)

A case where estimated total reach declines.

4 Spot Schedule	Estimated 1+ Reach	5 Spot Schedule	Estimated 1+ Reach
Spot 1		Spot 1	
Spot 2		Spot 2	
Spot 3		Spot 3	
Spot 4	42,416	Spot 4	
		Spot 5	41,355

Explanation:

The Reach and Frequency calculation procedures in the OzTAM Gold Standard are based on a well recognised philosophy of using all available data to generate the best estimates for the schedule being processed.

In the calculations the survey data is weighted to a universe estimate (UE) so the results from the sample can be used to estimate the audience for entire target population.

Unlike TARP estimates which only use weights from the relevant one day, and so do not change, the calculation of reach is more challenging. Reach is calculated by considering if each respondent saw one or more spots in the schedule. These spots can be on different days and respondents have different weights on the different days. For this reason, an average weight is used for each respondent. Reach estimates use the average weight across all days in the schedule.

Using an average weight can cause a variation as a spot is added or removed. If the additional spot is in a new day, then the average weights will change for the respondents. This can change the estimates for the total reach, as demonstrated above.

Incremental Reach

Q 2. "How can an extra spot deliver more incremental reach than viewers for that spot?"

The extra actual reach that a spot delivers, cannot exceed the actual audience for that spot. However, the Reach and Frequency estimation procedure may give an estimated incremental reach that is greater than the estimated audience for that spot.

An example:

The example below is based upon a 36 spot schedule where the estimated reach increment of spot 12 is 2,924, but the estimated audience (or TARP 000s) for spot 12 is only 2,510.

A case where the increase in the reach is greater than the TARP/audience for the spot.

	TARP 000s	Estimated 1+ Reach	Estimated 1+ Reach Increment
		Spots 1 to 10...	
Spot 11	6,898	73,137	
Spot 12	2,510	76,062	2,925
		Spots 13 to 36...	

Explanation:

The Reach and Frequency calculation procedures in the OzTAM Gold Standard are based on a well recognised philosophy of using all available data to generate the best estimates for the schedule being processed.

In the calculations the survey data is weighted to a universe estimate (UE) so the results from the sample can be used to estimate the audience for entire target population.

General practice is to adopt the best estimate for the 1+ reach and to calculate the Reach and Frequency estimates across the whole schedule to maintain internal consistency and to preserve the relationship of the schedule's overall TARP estimate and exact reach estimates.

In the example, the incremental reach between spot 11 and spot 12 (2,925), is the difference between the best estimate for 1+ reach based on the sample and average weights for all 12 spots and the best estimate for 1+ reach based on the sample and average weights for the first 11 spots only. The average weights for the 11 spot calculation is updated when a spot is added. That is, the average weights used to calculate 1+ reach to spot 12 will be updated to derive the best estimate using all the available data to spot 12.

TARP estimates only use weights from the relevant one day and so do not change, however reach estimates are calculated by considering if each respondent saw one or more spots in the schedule. These spots can be on different days and respondents have different weights on the different days. For this reason, an average weight is used for each respondent. Reach estimates use the average weight across all days in the schedule.

Thus for any one spot, the weight used in the reach calculation is different to that used in the TARP calculation, which can lead to a slightly higher incremental reach than spot TARP.

Reach Percentage Results

Q 3. "The cumulative reach in thousands up to a particular spot does not change when the schedule is extended, so why do the percentage reach results change?"

An estimated percentage reach uses the thousands estimates of reach and the thousands estimates of the target universe. While reach may stay the same, the average target universe estimate (UE) will differ between schedules if the target audience has a floating UE.

An example:

Consider two schedules; one with the 36 spots and another with an additional 6 spots on top of the original 36 spot schedule (42 spots in total).

The estimated reach in thousands for the first three spots does not change and is 41,030 in both schedules. But the estimated reach percent does change, from 23.4% to 23.3%.

A case where the estimated 1+reach % differs with floating universe estimates.

36 Spot Schedule	Estimated 1+ Reach 000s	Estimated 1+ Reach %
Spots 1 to 2...		
Spot 3	41,030	23.4%
Spot 4 to 36...		

42 Spot Schedule	Estimated 1+ Reach 000s	Estimated 1+ Reach %
Spots 1 to 2...		
Spot 3	41,030	23.3%
Spots 4 to 42...		

This example is based upon a target audience with a floating UE where the sum of weights varies slightly from day to day. This may be observed in other reach percentage estimates, not just 1+ reach.

Explanation:

The Reach and Frequency calculation procedures in the OzTAM Gold Standard are based on a well recognised philosophy of using all available data to generate the best estimates for the schedule being processed.

In the calculations the survey data is weighted to a universe estimate (UE) so the results from the sample can be used to estimate the audience for entire target population.

The universe estimate (UE) for the target audience in a Reach and Frequency schedule can be either "fixed"; that is it does not change from day to day or "floating".

Within OzTAM data, key industry population segments are set to fixed UEs. Other population segments are not directly set and will have small day to day variations in their sum of weights, leading to floating universe estimates, that is they change from day to day.

Thousands measures for reach are converted to percentage results by dividing them by the average universe estimate for the entire schedule. For a schedule based on a target audience with a floating UE, the percentage reach will change even though the thousands stay the same, as demonstrated in the example above.

2+, 3+, ...n+ Reach Declines within a Schedule

Q 4. "Why can the 2+, 3+, ...n+ reach estimate declines at certain spots within a schedule?"

The actual 2+, 3+, ...n+ reach would stay the same or increase if one were to add a spot to a schedule. But, the Reach and Frequency estimation procedure (used to estimate an actual value) may result in the estimated 2+, 3+, ...n+ declining in a schedule with an additional spot. The addition of a spot introduces new information and internal consistency is maintained.

An example:

An extra spot delivers a reduction in the 2+ reach from 42,585 to 42,313.

A case where an added spot shows a 2+ reach decline.

	Estimated 1+ Reach	Estimated 2+ Reach
Spots 1 to 10...		
11 spot schedule	73,137	42,585
12 spot schedule	76,061	42,313

Explanation:

The Reach and Frequency calculation procedures in the OzTAM Gold Standard are based on a well recognised philosophy of using all available data to generate the best estimates for the schedule being processed.

In the calculations the survey data is weighted to a universe estimate (UE) so the results from the sample can be used to estimate the audience for entire target population.

The general practice is to adopt the best possible estimate for the 1+ reach and to calculate the Reach and Frequency estimates across the whole schedule to maintain internal consistency and to preserve the relationship of the schedule's overall TARP estimate and exact reach estimates. The Reach and Frequency calculation procedures ensure that the 1+ reach does not decline when spots are added to a schedule.

The average weights used in the calculations may change when a spot is added, or when an adjustment to the 1+ reach is applied (ensuring it does not decline). This may result in the estimated 2+, 3+, ...n+ reach declining, as a result of the requirement to maintain internal consistency between the overall TARP and the exact reaches.