Opinion Letter
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When to Attend a Webinar?

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Abstract

Objective. To determine the most appropriate delay to start a webinar. **Methods.** This cross-sectional study was conducted on weekly general staff scientific webinars held by the Institute of Human Virology (IHV), University of Maryland School of Medicine, Baltimore, USA. 35 observations were made at arbitrary chosen times of three consecutive IHV webinars. After standardizing the number of participants, a 4th-degree polynomial fit was applied to the data. A cost function was defined as the sum of the time wasted for those who attended the webinar early and the lost for those who attend with delay. The cost function was minimized to compute the most appropriate delay to start the webinar. **Results.** The model could explain almost 95% of the observed variance in the number of participants. Normally, half of the participants attended the meeting at the webinar set starting time. The cost was a minimum if the webinar was delayed for about 3 minutes. **Conclusion.** It seems that the most appropriate time for starting the IHV general staff meetings is around 3 minutes after the webinar set starting time.

Key Words: Webinar ▪ Conference ▪ Scientific meeting ▪ Time ▪ Cost.

Introduction

Sharing information is an integral part of the scientific enterprise. Scientific meetings, in any form — congress, conference, seminar, *etc.* — are important forums for meeting of and sharing data among researchers (1). With advancements made in telecommunication, particularly, the Internet, and availability of the necessary infrastructures, many of these meetings have been switched to online webinars (2). This has especially become more prevailing after the emergence of the coronavirus disease 2019 (COVID-19).

Affiliated to University of Maryland School of Medicine, Baltimore, USA, Institute of Human Virology (IHV) holds weekly general staff seminars on various aspects of virology, molecular biology, epidemiology, and medicine. After the COVID-19 pandemic, the seminars were mostly run in the form of a webinar using Zoom™ teleconference software (Zoom Video Communications, Inc., San Jose, CA, USA). The webinars are typically scheduled for Monday at 11:00 AM, US Eastern time and last for an hour. The circle of the audience is limited to about 60 scientists, mostly IHV staff members, with different specialties. In most instances, the webinar starts with a delay to ensure that enough participants have joined it.

This study was conducted to determine when is the right time to start the webinar?

Methods

I counted at various times (conveniently chosen from a couple of minutes before the webinar set starting time [11:00 AM] to the end of the webinar), the number of participants taking part in three consecutive IHV general staff seminars, held on August 22 and 29, and September 12, 2022. The Zoom™ can provide the time and the number of participants. The number of participants was different among the studied webinars. Therefore, it was standardized.

Statistical Analysis

R software version 4.2.0 (*R* Project for Statistical Computing) was used for data analysis. For each webinar, the mean number of participants presenting between the 25th and 75th percentiles (the interquartile range) of the time measured since the beginning of the presentation, was calculated. The number of participants in each webinar was then transformed and presented as a percentage of this mean (Figure 1). A nonlinear curve fitting function (*nlsLM*() from *minpack.ml* package for *R*) was used for fitting a 4th-degree polynomial equation (Eq 1) to the standardized data (3). The function works based on the Levenberg-Marquardt nonlinear least-squares algorithm (4):

$$f(t) = \sum_{i=0}^{4} a_i t^i \qquad \text{(Eq 1)}$$

where $f(t)$ represents the standardized fraction of participants attended at time t; a_i are coefficients.

In a perfect world, all webinar participants should attend the session exactly at the set starting time (11:00 AM, from now on, it is referred to as time zero, Figure 1) and leave after the end of the webinar (gray line segments in Figure 1). However, some of the participants chose to attend the webinar a couple of minutes before the set starting time (Figure 1). Although they chose to attend earlier, their time would be wasted if we would not start the webinar on time. The area under the curve between the set webinar starting time and the time when the webinar really began (the pink area in Figure 1) reflected this waste of time. Another problem was the waste of learning opportunity; a number of participants would have learned something if they had not attended the meeting with delay (after the presentation had started). This waste of resources can be represented graphically by the light orange area in Figure 1. But, the weights of these two types of lost are not similar. The following parametric equation can then be an appropriate cost function:

$$cost\,(t) = \int_0^t f(x)dx + w\left[(t_m - t)f_m - \int_t^{t_m} f(x)dx\right] \qquad \text{(Eq 2)}$$

where t is the time when the webinar really starts; f_m, the maximum standardized fraction of participants derived from Equation 1; t_m, the time when the number of participants has reached its maximum value (corresponding to f_m, Figure 1); w, the weight of the cost attributed to the late attendance compared with the early attendance (here, it was arbitrary chosen to be equal to 2); and $f(x)$ the function of the fitted curve (Eq 1). Using basic calculus, the cost function was then minimized to find the most appropriate delay to start the presentation for different values of the weight (Eq 2).

Results

We studied a total of 35 measurements made during three consecutive webinars. The webinars began with a mean delay of 3.7 (range 3–4) minutes. The 4th-degree polynomial model could explain almost 95% of the observed variance in the number of participants (Table 1).

The maximum number of participants reached after 11.4 minutes after the start of the presentation (15.1 minutes after the webinar set starting time). Thereafter, the number of participants declined followed by a plateau until the end of the presentation. Normally, 47% of the participants attended the meeting at the webinar set starting time (Figure 1).

Plugging in the values obtained in Equation 2, for a weight of 2, the cost was a minimum if the webinar would have been delayed for 2.8 minutes (red dashed line in Figure 1), when 72% of participants had attended. The most appropriate delay to start presentation increased with increasing the weight (Figure 2).

Table 1. Coefficients of 4th-degree Polynomial (Eq 1) Fitted to the Data

Parameter	Coefficient (95% CI*)	P value
a_0	4.75 (4.36 to 5.13) × 10^1	<0.001
a_1	1.04 (0.91 to 1.18) × 10^1	<0.001
a_2	-6.00 (-7.16 to -4.82) × 10^{-1}	<0.001
a_3	1.33 (0.98 to 1.67) × 10^{-2}	<0.001
a_4	-1.01 (-1.33 to -0.70) × 10^{-4}	<0.001

*95% confidence interval; N=35; $r^2 = 0.944$.

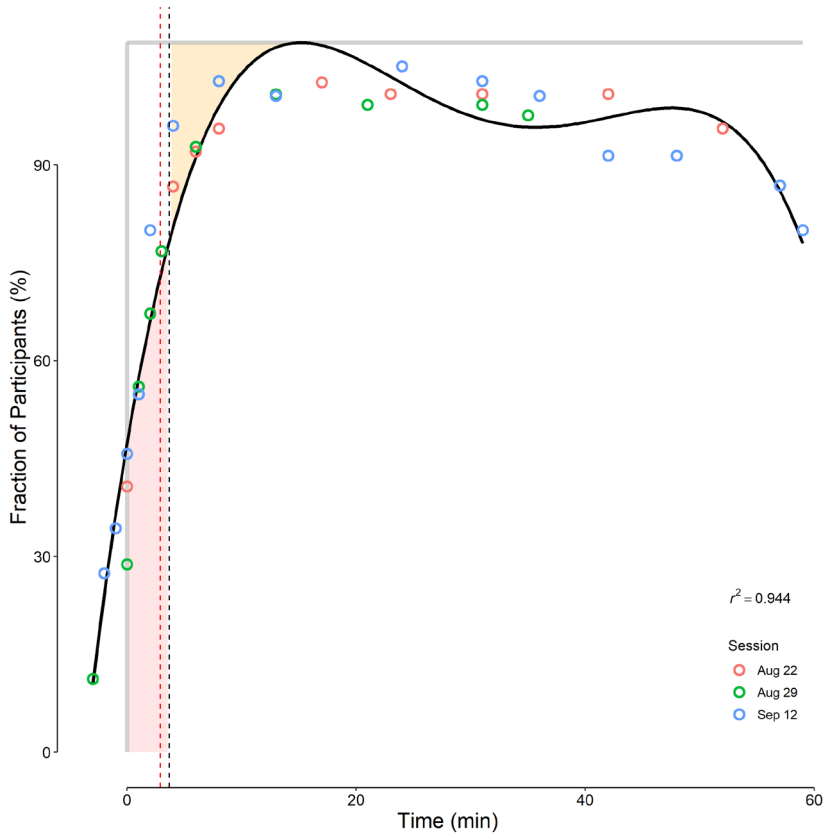

Figure 1. Standardized fraction of participants attended IHV staff webinars at different times. The gray line segments represent an ideal pattern of attendance. The solid curve is a 4th-degree polynomial curve fitting to the data points. The vertical black dashed line represents the mean delay of presentation after the set starting time for the webinar. The vertical red line is the optimum time for starting the presentation, assuming a weight of 2. The shaded areas reflect the costs incurred for participants — the pink area, for waste of their time due to delayed presentation; and the light orange area, for the lost educational opportunity due to delayed attendance.

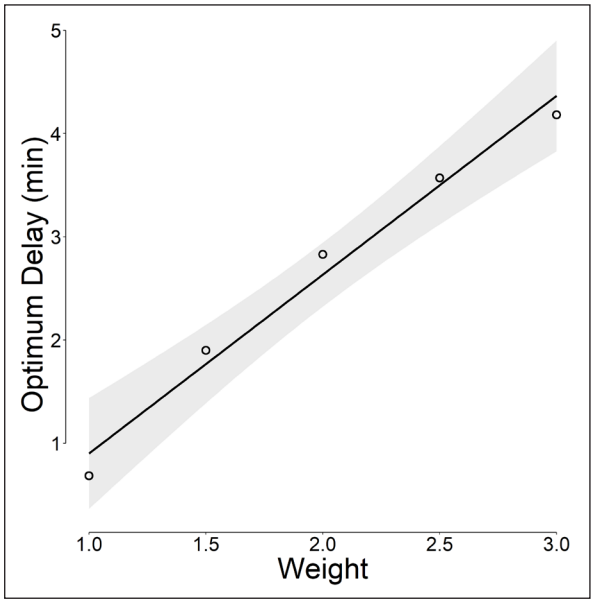

Figure 2. The optimum delay to start the presentation for different values of the weight (Eq 2). The shaded area represents the 95% confidence interval of the regression line.

Discussion

It seems that for IHV staff meetings, a delay of almost 3 minutes would minimize the total costs attributable to the waste of time for those attended early and lose of learning opportunity for those who attended late. The mean delay for the three webinars studied was 3.7 minutes, close enough to what was obtained analytically. The higher the weight, the higher the most appropriate delay to start the presentation (Figure 2).

The derived optimum delay of almost 3 minutes (for a presumed weight of 2) does just work for the IHV staff meetings and cannot be applied to other webinars. The audience of the IHV staff meeting is heterogenous in terms of their specialty and level of experience. It seems that it takes around 11 minutes for a typical audience to decide whether the presentation is interesting and stay in, or prefer to leave the webinar. This is the cause of the sharp decline in the number of participants after 11 minutes of the presentation and the plateau thereafter (Figure 1), I believe. Although starting the webinar after a certain delay would increase the effectiveness of the meeting, this action would inclusively give a signal to the audience that the meeting will be held with a known fixed delay, which in turn is equivalent to the shifting of the webinar set starting time. Knowing about this fixed delay, the audience may then adjust to the new set time, change their behavior and attend the conference with more delay. This adaptive process will ultimately result in regression to the *status quo*.

Limitations of Study

One of the limitations of this study was the low number of webinars studied. However, considering the audience in each webinar is almost invariant, their behavior can be considered almost constant (Figure 1). Therefore, the 35 observations made could provide enough study power. While the methodology can be applied to other meetings, the values reported herein cannot be generalized to other scientific meetings or group of audience.

Conclusion

In conclusion, it seems that being acquainted with most of the audience and being familiar with the structure of the IHV and its meetings, the IHV webinar organizers could heuristically, manage the necessary delay of 3–4 minutes to minimize the cost incurred.

Conflict of Interest: The author declares that he has no conflict of interest.

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