Is the promise of beer effective to maintain a high attendance level at late stages of scientific meetings?

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Many scientific conferences suffer from a reduced participation towards their end. In this contribution, we present evidence that the participation at late stages can be increased by offering beer to the participants. For this purpose, we evaluated a scientific meeting by determining the temporal behavior of both, the deviation from the mean of the number of attendees, and their number fluctuation. We demonstrate that offering beer is effective to achieve a high level of attendance and to suppress number fluctuations at the same time, even under unfavorable circumstances.

Introduction

A well known impression that share organizers and some participants of scientific meetings is that the attendance of the individual talks of the meeting depends on the placement of the talk within the program. To be specific, talks that are given just before a coffee break or at the end of the day seem to suffer from decreasing attendance. Different recipes are tested to cope with this phenomenon, which, at least for the authors of the affected talks, is greatly undesirable.

In the present study, we shall proof using simple statistical methods that the subjective impression as described above is correct. For this purpose, we choose a conference held on Friday afternoon, a date that is expected to exhibit the phenomenon to the largest possible extent. Secondly, we tried to establish a correlation between the attendance to the conference on one hand, and a frequently used method to suppress or, at least, limit the extension of the expected loss of the audience on the other hand. For the conference under study, the organizers choose to offer beer to the participants after finishing the conference. We shall assess in this contribution the effectiveness of this idea.

The study is organized as follows. In the subsequent Materials and Methods section, we shall describe the conference that we evaluated and the statistical methods we used. This will be followed

by a Results and Discussion section, where we draw the conclusions relevant for the question raised in the title. In addition, we shall give an outlook of how to extend the present study systematically in order to further aid organizers of scientific conferences.

Materials and Methods

The conference that we evaluated in the present study was the annual proceedings meeting of the Research Center for Material Science (MWFZ) at the Johannes-Gutenberg-Universität, Mainz, Germany. The meeting was held on Friday, June 25, and started at 13:00h. A Poster Session combined with a coffee break divided the meeting into two parts with four scientific presentations each. Topics covered not only Chemistry and Physics, somehow essential for Material Science, but also applications concerned with medical and biological questions. The opening of the meeting was provided by the Vice-president for Research of the University. We already note here that these openings are notorious for their hard to follow topic and organization. We therefore take care to provide information which enables to separate this side effect.

The conference was finished at 18:30h with a terminating Poster Session and the complementary offer of draft beer from a keg and *Brezeln*, a regional specialty made from a cord of bread paste that is knotted to yield something like a figure eight, with some salt grains sprinkled over it.

The meeting took place on a bright and hot summer day, while climatization within the lecture hall was acceptable.

In order to evaluate the attendance to the talks, we simply counted the number of persons within the lecture hall. This was performed as follows: When the respective session started, we counted initially the persons within the lecture hall. This number count was checked twice. Subsequently, we counted the number of persons passing the sole door of the lecture hall up to a specified time. The time intervals i (of 30 min each) were chosen such that the end of a talk (lasting 30 min) and the beginning of the subsequent one took place at the center of the interval. This helps to reliably count those persons who attend only an individual talk. The procedure as described above was performed separately for both parts of the conference.

Owing to human incapabilities, the number count is assumed to be exact to within one person only. This was verified by comparing the summed entries and exits at 18:10h with an independent count of the persons within the lecture hall. Whereas the summation yielded 57 attendees, the number count gave 58, thus confirming the error stated above. Every error given in what follows results from an error progression of this uncertainty.

As mentioned already, we determine the temporal behavior of the number N of attendees and determine their number fluctuation using the following formulae. The mean is the arithmetic average

$$\langle N \rangle = \sum_{i=1}^{Z} N_i / Z \qquad (1)$$

where Z is the number of evaluated intervals. The number fluctuation is

$$\Delta N_i = \left| N_i^+ + N_i^- \right| \qquad (2)$$

where N_i^+ and N_i^- are the numbers of people entering or leaving, respectively.

We note that ΔN_i differs from the deviation from the mean, $N_i - \langle N \rangle$. Whereas the former is a measure for the number of people that leave the lecture hall for a comparatively short instant of time, the latter reflects the tendency of the audience to stay at the meeting or to leave permanently. This is in close analogy to temperature dependent effects in statistical physics, where $N_i - \langle N \rangle$ would reflect, for instance, a temperature drift during the measurements, whereas ΔN_i could be used as a measure for the distance from a critical point.

Results and Discussion

In Table I we collect the results of the number counts during the meeting. Let us start with some technical remarks. Due to the counting procedure as described, the fluctuation in interval i = 1 equals zero necessarily. Three intervals are shorter than the remaining ones; they reflect the end of the respective conference part or the effect of the introductory talk. We observe a strong increase in number of attendees after the first five minutes of the first part, which is most probably a result of the talk given before (cf. the remark above).

Table I: Temporal evolution of the number of persons within the lecture hall (N_i) and the number of people moving in (N_i^+) or out (N_i^-).

i	Time	N_i	N_i^+	N_i^-
1	13:10	67	0	0
2	13:15	72	5	0
3	13:45	74	3	1
4	14:15	79	11	1
5	14:45	85	12	6
6	15:15	77	9	17
7	15:30	77	0	0
1	16:20	64	0	0
2	16:50	67	3	0
3	17:20	67	2	2
4	17:50	61	4	10
5	18:20	57	0	4
6	18:30	58	1	0

We note that intervals that are not equally spaced have to be re-scaled for exact statistical significance. For simplicity, we disregard them simply in the present evaluation.

The average number of attending persons is $\langle N \rangle$ = 78.2 ± 3.5 (i = 1 .. 6) in the first part of the meeting and $\langle N \rangle$ = 63.2 ± 1.9 (i = 1 .. 5) in the second part. The error is the usual standard deviation of the mean. The first decimal is given for reference purposes only. The number of seats in the lecture hall is limited to about 120, which means that the lecture

hall is filled up to three quarters. We interpret this as a high attendance level in view of the expectation of the organizers.

The difference of both values is due to the fact that not every attendee of the meeting returns to the scientific session after the coffee break. This behavior of scientists is well known, but may be more pronounced in the present study due to the environmental situation at the day of the meeting.

Fig. 1 shows a plot of the relative deviation of the number of attending persons from the mean as a function of the elapsed time Δt after the beginning of the respective part of the meeting.

It is clearly visible that the number of attending persons exhibits stronger deviations from the mean in the first part of the meeting than in the second part. There are two obvious reasons for this. Firstly, like many humans, scientists tend to be late. Secondly, some participants find out after a certain period of time that they should do something different than

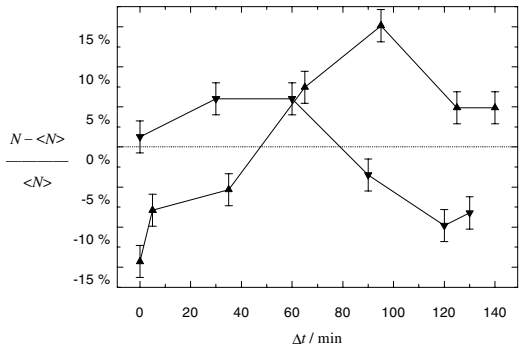

Fig. 1: Relative deviation of the number of attendees from the mean. Up triangles: first part of the meeting, down triangles: second part of the meeting. Straight lines are guides to the eye.

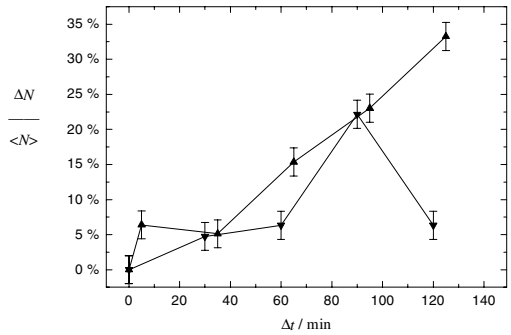

Fig. 2: Number fluctuation of the attendees. Up triangles: first part of the meeting, down triangles: second part of the meeting. Straight lines are guides to the eye.

further attending the meeting. Equilibrium between these trends is expected to be established after approximately one hour after the beginning of the conference and should therefore not be observed in the second part of the conference.

Besides this, the attendance increases at the beginning and drops significantly at late stages. We consider this behavior as the proof for the impression called subjective in the introduction.

The relative deviation of attendees from the mean must fluctuate owing to purely statistical (say, thermal) reasons. From Fig. 1, we determine a value of approximately 5% to be the statistical deviation in attendance of a meeting.

In Fig. 2, we show the number fluctuation ΔN_i of the attendees. Up to Δt = 100 min, the data for both parts of the meeting show a very similar behavior. This similarity can be explained by the general observation that humans usually stay at a fixed place only for a limited time. After this time, which is different for every individual, people tend to visit the

washing room or fetch a new beverage. If this explanation holds, the general temporal trend of the number fluctuations should be the same for both sessions, which is indeed observed up to Δt = 100 min. We note that the specific influence of the introductory talk is again clearly visible.

After Δt = 100 min, however, the data sets exhibit a clear difference. In the first part of the conference, the number fluctuations increase further towards the coffee break. A power law fitted to the last four data points of the first session yields a growth exponent of 3/2. The opposite is true for the beer reception, where the number fluctuations decrease dramatically.

We interpret the observed different temporal behavior of the number fluctuations of the two sessions as due to the promise to serve beer after the last talk. Whereas in the first session the usual behavior of persons attending conferences is observed, the expectation of a cold beer suppresses the number fluctuations. Together with the still high attendance level, we can answer the question raised in the title with a clear yes. This interpretation can be further supported by the observation that almost all of the 58 participants that were present at the closing of the conference attended the beer reception. Unfortunately, due to the high mobility of the participants at that time, and the beer consumption of the author no quantitative data are available.

Let us suggest the following explanation for the different temporal behavior of the two sessions. A coffee break is usually accompanied by long queues of people waiting to be served. Correspondingly, scientists may be tempted to overcome this problem by leaving the lecture hall as soon as reasonably possible. This is certainly easier for people seated close to the aisle. People in the central part of a row might choose the break between two succeeding talks to leave the hall. This mechanism could even explain the power law observed for this process.

However, with the beer reception, this mechanism is altered. Draft beer takes some time to be prepared. Accordingly, nothing or little is gained to be the first in the queue, as one has to wait anyway. Therefore, we speculate that this effect suppresses the large fluctuations observed before the coffee break.

In addition, it may play a role that the conference is about to be terminated anyway, so politeness suggests to stay in the lecture hall up to the end. If this, however, would be the only acting effect, the high attendance level observed still favors a positive answer to the central question.

Conclusion and Outlook

We investigated the number fluctuations of attendees of a chosen meeting applying simple statistical methods. We

observed a clearly different temporal behavior of the number fluctuations before the coffee break on one hand, and before the beer reception that terminated the meeting on the other hand. In addition, the deviation of the number of attending persons from the mean was clearly larger before the coffee break than before the beer reception. From these observations we conclude that the promise to offer beer to scientists at the end of a meeting indeed serves to stabilize the attendance at a surprisingly high level and suppresses undesirable number fluctuations as well. This mechanism seems even to be effective under circumstances that usually favor a low attendance (bright weather, the ensuing weekend).

Clearly, any statistical study is prone to problems due to a limited amount of independent ensembles. The observations should therefore be checked by a similar study of a different meeting. In addition, the instants of time over which the fluctuation were summed could be chosen to be shorter. However, there are no indications in the raw data that this would significantly alter the results.

In view of the presented results, we should like to suggest some further points of interest. First, our explanation for the observed effect relies on the kind of service offered in terminating the conference. It would be very interesting to study whether the offer of, *e.g.*, *Woi, Weck un Worscht*, also a regional specialty, would yield corresponding results.

In addition, the selected topics of the talks may have influence on the behavior that we observed. We disregarded this influence in the present study because we could not detect a corresponding preponderance of a specific scientific topic in the program of the meeting under study. However, this is a subjective impression of the author and can certainly be evaluated more systematically. This way, it may even be detectable whether physicists, for instance, show a stronger attraction to beer than physicians.

These investigations are probably of great interest for those of the scientific community, who are about to organize a conference and should like to do everything to guarantee a big audience for the scheduled talks.

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