CLASSIFYING SEMINARS

P,S.Subramanian
Theoretical Computer Science Group
T.I.F.R

Abstract

When describing a technical presentation we often use adjectives like coherent, insightful,clear,confusing etc. This note is an attempt to give some precision to such adjectives.

As a by-product we get (i) a basis for designing 'seminar evaluation reports' and (ii) some guidelines for a good technical presentation.

Can Seminars be judged 'objectively'?

One is often called upon to evaluate seminars. Over a period of years one accumulates a set of descriptive phrases to describe the qualities of these seminars- clear,incoherent,insightful motivating-etc.. Although one realises that these phrases can never be given a precise semantics-it, among other things, clearly depends on the evaluators! - one also realises that a certain degree of objectivity- or,shall we say 'stability of meaning?'- can be attached to these phrases. How does one go about distilling this stable part?

One possible approach is through a method often used in science: Try to isolate the subjective part *within* a set of primitive concepts and then insist that rest be analysed objectively. In our setting this means we have to find a decomposition of the seminar presentation into primitives and then use the decomposition structure, properties of the primitive elements etc to assign more precise meanings to the phrases describing the seminar. The idea being that, the subjective aspects are now 'contained' within the process of evaluating the properties of the primitive elements and the task of evaluating these primitives, though still subjective, is possibly less so because of the reduction in complexity.

We expect some fallouts from such an analysis: First it can give guidelines for students preparing for a technical presentation. Secondly , it can serve as a basis for designing a 'semianr evaluation report' -similar to the CR's which are already in use in our Institute.Finally, constructive feedback to the students is made possible by precisely identifying those aspects of the seminar which need improvement.

DISCLAIMER 1: This note applies only to presentations of of 'formal' topics.(These topics *admit* a presentation in the 'Landau style'- Axioms, Definitions, Satz, Beweis. A major portion of this article is devoted towards convincing the reader that, though such a style of presentation may be sufficient for a specialized technical audience, it is not sufficient for a general scientific audience: In fact there are good reasons to beleive that even for a specialized audience

mere logical correctness is not enough.) Good seminars on such topics can be characterised as follows: After clearly stating the prereqisite concepts and some chosen relations between them, one proceeds, during the course of the seminar, to define certain other concepts and derive some new relations between these derived concepts using mainly *formal deductions*, which, other persons - in particular those outside the sub-field, but having a certain degree of mathematical maturity- can follow.We do not, of course, mean that deductions are exibited in a formal system, merely that they be rigorous!

DISCLAIMER 2: This note does not address other 'stylistic' and 'multimedia' aspects of the seminar.

The Format of the Presentation

The presentation is in two phases: during the first phase a conceptual framework which provides the prerequisites for understanding the results of the second phase are laid out. The first phase consists of definition of the primitive concepts, examples illustrating these concepts and some well chosen relationships- codified in Theorem/Lemma format- between the primitive concepts. The examples themselves are classifiable into + or - , and Degenerate or Non-degenerate. Non-degenerate -ve examples- those which narrowly fail to fulfil the requirements of being an instance of the concept- play a vital role in making the audience understand the concepts clearly. (Non-degenerate +ve examples do not seem to be as powerful in this respect! This asymmetry is perhaps due to the fact that human comprehension is 'constructive' and hence reasoning with negation is a rather unnatural process. This gives a good Non-degenerate -ve example a shock value not possesed by it's +ve counterpart. In this context,it is also interesting to note that during the phases of a child's mental developemnt the phase during which it can tell differences between objects occurs much later than the phase during which it can tell similarities). Now, let us turn to the 'relationships' part. The purpose of this part is as follows: The intuition about the primitive concepts already conveyed by the examples is sought to be sharpened by identifying some, perhaps surprising relationships between the primitive concepts. Secondly, appreciation of some of these relationships may be vital to phase II of the presentation.
Phase II is quite similar to Phase I execept that new concepts being defind also have to be provided with motivations for them.

Finally, note that any non-trivial formal subject is built up by iterating such (phase I-phase II) sequences.. Later, in this note we point out that the conceptual importance of the 'Motivation' for research purposes. These facts 'prove' that humans have to operate in 'research mode' during a good learning process. Moreover, such modes are 'dense' in the whole process.

Notation: [.,.,.] - a sequence
+,- - Positive and Negative Examples

D,Nd - Degenerate and Non-degenerate Examples
P.. - Primitives
D - Defineds.
= - defined as

PRESENTATION = [Primitives,Defineds]

[Primitives]= [Pconcepts, Prelations]

[Pconcepts]= [PDefinition,PExamples]

[Pdefinition]= [A formal definition of the primitive]

[PExamples]= [P+D,P+Nd,P-D,P-Nd]

[Prelations]= [Preldef,Preleaxmples,PrelMotivations]

[Preldef]= [Statement of Theorems/Lemmae etc relating P's]

[Prelexamples]=[Similar decomposition to Pexamples

only here 'examples' are called 'special cases' and 'instantiaions']

[PrelMotivation]=[Out of so many possible relations between
primitive concepts why this particular combination of concepts is
thought to be important enough
to be elevated to the status of a
new Theorem or Lemma etc..]
In this note 'providing a motivation' will mean 'justifying' such a choice.

This completes phase I of the presentation. At this point the audience is 'primed' i.e a conceptual frame is set up through which he can appreciate the Defined part.(Voltaire should be satisfied at this point!).

So, how does the phase II (the DEFINED) part look like?

It is almost exact copy of the primitive part execpt one crucial difference: you have to provide motivations for the new definitions also.

[Defineds]=[DDefinitions,Drelations]

[DDefinitions]=[Definition,Dexamples,Dmotivations]

[Drelations] =[Dreldef,Drelexamples,Drelmotivations]

This Completes formal definition of the format of the presntations.It is a nested sequence of sequence of ....

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How well each basic element in the sequence is tackled by the presenter is to be judged. Here the subjective aspect enters the picture.

Of the above items, those falling under Examples and Motivations are part of 'Psychologic'- We use this phrase, because even without these two components the seminar will be complete in a logical sense. The items falling under 'Psychologic' do NOT give any new possibilities of deduction which are not already implicit in the other parts which are part of 'Logic' of the Seminar. But they are essential for providing 'insight'. Of the items in the 'Psychologic' - the Motivation part is extremely important for a research type presentation. 'What new concepts are worth defining? Which particular relationships between these concepts are worth exploring?'- These sre some of the questions a student will face as soon as he embarks on a research career. The Examples part is important for all types.

Now, we can try interpreting the descriptive phrases:

A presentation which misses any of the basic elements of the format is said to be INCOMPLETE, else not.

A presentation which tackles the 'Psychologic' part well is an 'INSIGHT'ful presentation else not. Note that in general, it is rather difficult to give an insightful seminar according to this definition. Coming up with good non-degenerate -ve examples which are also 'natural' can be quite tricky:in fact so tricky that they may be open problems themselves! In detail: Let us say a concept is defined by properties P1, P2, ... Pn. Then a Non degenerate -ve example will be an objcet satisfying most Pi's but not all of them. In particular, if one can show that for each i, there exists an example not satisfying Pi but satisfying all the others, then effectively we have shown that there is no dependance betwwen the Pi's and the definition of the concept has no redundancies. To appreciate the fact that this task can, sometimes be quite difficult, , observe that, in the context of axiomatic systems, the production of such highly non-degenerate -ve examples amounts to showing independence of some axiom from the others: Bolyai/Lobachevsky construction of a non-eucledean plane is a Non-degenerate -ve example for the concept of Eucledean Geometry, invalidating the parallel postulate but validating all others. Non-negative rationals form a Non-degenerate -ve example for the concept of Non-negative integers, invalidating the Law of Well ordering but validating all the others. Independance of the Axiom of Choice from the rest of the axioms of Zermelo-Fraenkel set theory by Cohen was considered an intellectual feat.

Now, let us see the difficulties involved in providing motivations: properly motivating new definitions and introduction of new concepts needs knowledge about the historical developement of the subject- in particular about earlier 'failed attempts'. This is not often provided by (most) text-books. Hence this aspect demands a certain amount of scholarship from the presenter. One can easily identify a seminar which fails in this aspect by observing how many times the presenter is forced to respond-in a slighlly raised voice- 'BECAUSE it is DEFINED so.(Assuming a live audience, of course!).

Any presentation which handles the Definitions and Relations part rigourously is said to be CLEAR else not.

Finally, observe that we have defined the presntation as a nested sequence of linear orders. (Actually, we have made some inessential choices in ordering. If we eliminate them, we will end up with partial orders).

A presntation whose temporal ordering is a consistent linear extension of the order specified by the 'format' is called a (temporally) COHERENT presentation, else not. One may try to quantify the degree of incoherence if one so wishes!.

Here one might point out the issue of Logical coherence: this refers to the 'density' of interconnections between the concepts used in the seminar. We did not want to focus on this in this (preliminary) note, because sometimes it may happen that the 'state of the art' of the subject matter may be such that it is impossible to give a logically coherent presentation. Of course, if the state of the art allows one of such a possibility and still the presenter fails to do so, then ...We will handle these issues in a later version of this note)

Using this terminology one knows for example, what an 'insightful but unclear' presentation is. Also what a 'complete but incoherent' presentation is. (Not to be confused with a completely incoherent presentation! This is measurable by a degree of incoherence metric alluded to earlier)

Conclusion

We have made an initial attempt to lay down the parameters for classifying seminars and desiderata for a 'good seminar'. Needless to say, this concept itself has evolved by observing it's +ve and -ve instances. I wish to thank all those who created these instances.