First, I'd like to amplify something Susan said in the workshop today. She said, "We expect you to use chalk in your presentations." What she meant by this is that using chalk is fine; but using slides is fine, too, and sometimes a combination of the two works well. It's generally time consuming to produce good slides, and she was saying that chalk will be just fine - most of the time. There are situations when you want to show an image or some data, and then slides are essential.

Here are some notes and comments about the two talks we heard in the workshop on Monday. In a class discussion many more observations would emerge.

First talk: Nat Stapleton

Nat has a forceful delivery: every word has life and energy in it, and is comprehensible. His boardwork was excellent (except that he missed obvious opportunities to use color!). He faced the audience systematically, used gestures effectively, and avoided blocking his board work. He accompanied many of his formal statements with side comments trying to explain them.

Nat was anxious about his ability to draw knots, and didn't draw a single one. I guess in compensation for this, he began with a formal definition of a knot. This was unmotivated, and I had a sinking feeling as it reeled out. What was especially annoying about the definition as stated was that the requirement that the knot (as we usually think of it) should not intersect itself was hidden inside a symbol: remember? k(x) = k(y) <==> x , y congruent mod Z.

Also, the decision to write out a formal definition forced him to introduce a concept extraneous to the rest of the talk, namely, orientation. And then the way he removed an orientation was certainly hard to understand.

Similarly the notion of deformation was handled formally, without much motivation. In fact he increased our uncertainty about this idea when he introduced it with "... what is known as ambient isotopy" -- clearly signaling that this is an arcane concept.

Formal definitions certainly have a place in a math talk. But they often contain many questions, rationales, and hidden choices. If these hidden points are not somehow addressed, the audience will be uneasy and unhappy.

As best as I can recall, Nat didn't motivate the introduction of knot coloring. When he defined a coloring of a knot, he cleverly broke it into two steps: pointing out that any knot can be colored with three

colors satisfying the crossing condition; this is a "stupid definition." Then he introduced "nontrivial coloring" to repair that. This was a good trick.

His statement of the main theorem didn't really give the main result, which is that a knot with a nontrivially colorable diagram cannot be equivalent to one with a diagram not admitting such a coloration.

On the other hand, he was always careful to say that one colors a knot diagram and not a knot.

When Nat came to prove the theorem, he turned his back to the audience and said "R1 and R2 are trivial." Nobody likes hearing that! No matter how "trivial" something is when you look into it, it's a bad idea to call it trivial in a talk, because the audience will immediately worry that if they try they won't get it and will feel bad because it was supposed to be easy. I wished at this point that he had asked the audience to help him decide on colors; he looked rather lonely there trying to work them out for himself.

Of course it would have been better if Nat had used colors in his account of parts of the proof. I didn't gain anything from the second case that I hadn't already understood from the first case.

Summary: Nat was unsure of his ability to explain things without using very precise definitions. As a result, he didn't do a very good job focusing on the main points. In the audience, I often felt that I had missed something, and that the delivery was rushed. In actual fact Nat's delivery was quite deliberate, not rushed, but the gaps in motivation and missing key points made it feel that way.

Second talk: Saul Glasman

Saul had generally good board technique and voice. He also communicated well with the audience, faced us pretty systematically, and had generally good writing though not as good as Nat's. He wrote fewer words on the board than Nat did, and I thought came closer to the ideal amount of writing (not too much, not too little).

Nice to write the title on the blackboard. (In these talks, it's also nice for the speakers to introduce themselves.) Saul began with a somewhat informal description of what a knot is, with some examples, and then stated the main question of the subject -- how to classify knots, and especially how to tell knots apart from each other.

Saul was more obviously tied to his notes than Nat was. Notes are a distraction for the audience, and are often actually unnecessary. Try to live without holding onto them like a ski-rope.

He made a disastrous choice in sliding both boards up and drawing his examples on the fixed blackboard at the back. Then it was immediately covered by the board containing the Reidemeister moves. (I may mis-remember, but I think neither Nat nor Saul wrote out this gentleman's name -- an oversight.)

Around this point I felt that Saul's voice would fall at the end of some sentences, making it hard to understand him.

I liked his definition of a knot invariant - a property of a projection shared by all projections of the same knot. This isn't the standard way to define an invariant, since there are invariants which are not defined in terms of a projection. But it works well in this talk.

At that point he asked: Any questions? and paused. This brings up a general comment about "active learning" in a math talk: Generally lecturers in a mathematics seminar ask only rhetorical questions. (The one exception is this: asking if there are questions!) This is a big distinction between seminar talks and, say, recitations. On the other hand, in many mathematics seminars the audience is expected to voice their questions spontaneously, interrupting the flow of the lecture. This is not regarded as rude (unless it's overdone!).

Having introduced the idea of a knot invariant and the need for one, Saul started to talk about coloring. But he made a mistake (which could have been corrected by the audience) in saying that a coloring of a knot is… rather than saying that a coloring of a knot projection is…

Of course it was a sensible idea to use colors for the colors. But if you're like me, you probably found it impossible to distinguish between blue and green. Blue (or green) and yellow would have made a better choice.

In his proof, Saul drew an impressionistic picture of a big knot, and then isolated a small section in which he would study a Reidemeister move. He called this a bubble, and zoomed in on it, or blew it up. This was very nice, and an important idea. This idea is necessary to understand the concept of Reidemeister moves, actually. Was it a mistake for him to have not brought this up when he first introduced Reidemeister moves? Doing things the way he did was a choice. He allowed us to remain, potentially, somewhat confused about how you apply Reidemeister moves in an actual knot, till he got to this proof, and then he clarified the concept. This is a risky decision, but I think it worked well for him.

There were noticeably more questions after Saul's talk than after Nat's. Paradoxically, the more questions an audience asks, the better they have understood the talk. In this case, of course, we'd just heard the material for a second time, so of course we understood it better. Still, I think Saul's talk was a lot more open and relaxed, more inviting of questions and learning.

18.821 Project Laboratory in Mathematics
Spring 2013