How To Give a Talk

Advice on Preparing and Presenting Technical Talks in the Mathematical Sciences

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Outline

- Motivation
  - Giving a good talk is important!
- Preparation
  - Know your audience
  - Convey a central message
  - Putting together the slides
- During the presentation
  - How to speak
  - Where to stand
- Wrap-up

Giving a Good Talk is Important

Particularly for students and recent graduates!

- More people will see your talks than will read your papers or will speak with you in person
- The audience will form their impressions of *you* and *your work* based on your talks
- Early in your career, every talk should be treated as if it is as important as an interview talk

When, Where, & Why

When: Start as early as you can — no later than one year before you get your PhD

Where: Student seminars, internships, local conferences, national meetings, special meetings

Why: Talks are how you become known to the world

Footnote: Posters are another way to present your work

Know Your Audience

- **X** One of the biggest mistakes speakers make is not knowing their audience

Important: Ask your host what the audience will be like *before* you prepare your talk

- Will your audience include. . .
  - Specialists in your sub-field? In your field?
  - Researchers in the mathematical sciences?
  - Engineers and scientists?
  - Graduate students? Undergraduates?

The Central Message

What did you do? Why is it important?

- What's the one sentence summary of your talk that the audience should walk away with?
- Tune your message to your audience
- Repeat the message over and over again throughout the talk
- Keep the content of the talk focused on the central message

Sample Messages

- Specialists/Optimizers: We have created an *asynchronous* parallel pattern search method which is *faster* than the standard method and for which we can prove a *global convergence result*
- Engineers: We have a new *derivative-free* optimization method that runs in *parallel*, is *faster* than the competition, and has *solved several real problems*
- Students: We have combined ideas from *asynchronous parallel computing* and *pattern search methods* for optimization to come up with a new method

Outline of a Math. Sci. Talk

- Title Slide
  - Credit to co-authors and funding agencies
- Outline
  - Skip this for 10-15 minute talks
- Background Material
- What you did!
  - New algorithm, theorem, proof, etc.
- Why is it important?
  - Numerical results
- Summary & future work

Background Material

- Minimize background material
- Don’t spend too much time on background — at least two-thirds of your talk should be your original work
- Identify those who have done related work (papers, software, or ideas) and spell their names correctly!

Hint: People love to hear their own names

- Describe any motivating applications that will later tie into your numerical results

What is KKT? [Adapted from talk by Ilse Ipsen]

- KKT: Karush Kuhn Tucker
  First-order necessary optimality conditions for constrained minimization problems
- KKT System: System of linear equations
  $Kx = b$

$$K = \begin{pmatrix} A & B \\ B^T & 0 \end{pmatrix}$$

- KKT matrix: K is
  - real, indefinite
  - large: dimension $200 \ldots 22000$
  - sparse: $\leq 1.85\%$ non-zero elements

What You Did!

- Emphasize your simple message repeatedly
- Back it up with details of algorithm and theory
- Use pictures and diagrams as much as possible in lieu of wordy explanations
- Keep notation to a minimum and avoid too many abbreviations
- Never use equation numbers — repeat the equation if necessary
- Illustrate your points via simple examples

Why Is It Important?

- Think big picture
- Emphasize an application
- Tables. . .
  - Don’t make font too small
  - Use color for emphasis
- Figures. . .
  - Be sure axes are clearly labeled
  - Use color to differentiate lines
  - Try exportfig in Matlab

APPS Reduces Idle Time

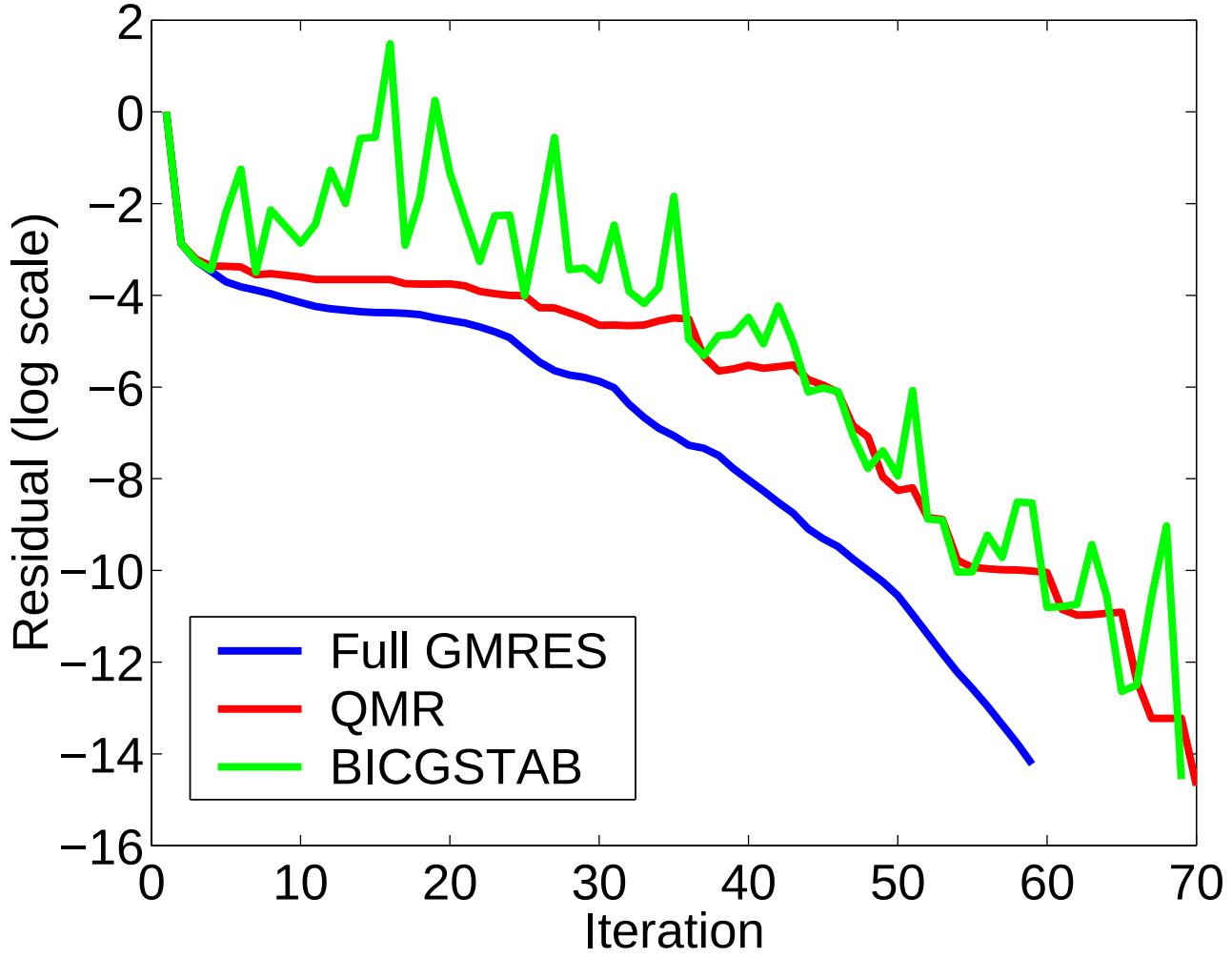
$$f(x) = \sum_{t=1}^{N} \left(V_t^{\mathrm{SIM}}(x) - V_t^{\mathrm{EXP}} \right)^2 \quad \text{(17 variables)}$$

- Search directions are $\pm$ Unit Vectors (34) plus Random
- The variables are bound constrained; i.e., $l_i \leq x_i \leq u_i$

Method	Procs	$\mathbf{f(x*)}$	Fevals	Idle Time	Total Time
APPS	34	26.2	57.5	111.92	1330.55
APPS	50	26.9	50.6	63.22	807.29
PPS	34	28.8	53.0	521.48	1712.24
PPS	50	34.9	47.0	905.48	1646.53

(Times are in seconds)

Comparison of 3 Iterative Methods



Summary & Future Work

Repeat what you did and why it was important!

- Future work is important for students and recent PhD's because it shows that you are thinking beyond your thesis problem
- Include your contact information at the end
  - Email
  - Web page

Creating Your Slides

- Use LaTeX with the seminar class
  - Handwritten talks are hard to do well
  - PowerPoint has trouble with equations
  - This talk uses prosper (derives from seminar)
- Use LaTeX packages
  - color
  - graphicx
- Use the picture environment to draw pictures in LaTeX

Basic Do's and Don't's

Do: Use landscape orientation

Don't: Put transparencies in plastic

Don't: Forget to title each slide

Don't: Overcrowd the slide

Don't: Use yellow on a white background!

Do: Use lots of pictures

Do: Make the fonts large (try the floor test)

Don't: Forget to check grammar and spelling

Practice, Tuning & Timing

- Prepare your talk *at least* one week in advance
- Practice! Practice! Practice!
  - Helps with nerves on the day of the talk
  - Get feedback on the practice talks
- Perfect the timing
  - Allow 3-5 minutes per slide
  - Use the practice runs to be sure that you can finish on time

Getting Yourself Together

- Dress professionally
  - *Especially important for an interview!*
  - Outfit should accommodate a microphone
- For an overhead talk, bring. . .
  - Transparencies, extra transparencies, and pens
- For computer talk, bring. . .
  - Computer, power cord, electronic back-up, back-up transparencies (!)
- Bring your own pointer

During the Presentation, Part I

- Nerves are natural
  - Take a deep breath and keep going
  - The extra energy will help your talk
- Speak slowly, clearly, and loudly
- Do not block the audience's view
  - Try to stand next to the screen
  - Point to the screen, not the projector
- No cover-ups

During the Presentation, Part II

- Be explicit when referring to the slides
  - Avoid saying “this” or simply pointing
  - Could a remote listener follow the talk?
- Don’t run over on time
  - Be respectful of the audience’s busy schedules
  - It’s better to be five minutes short than five minutes over!
  - Take complicated questions offline

Questions & Answers

- Repeat questions before answering
- Good answers when you're on the spot:
  - "Excellent question! I hadn't thought of that before, but I'll get back to you."
  - "I'm not sure I agree with you, but we should probably talk further offline."
- Have respect for the questioners and their questions
- Inevitably, someone will tell you that your work has already been done by someone else!

Acknowledgments & References

- My mentors and colleagues: Juan Meza, Dianne O'Leary, Pete Stewart, Misha Kilmer, and many others
- 1996 AWM Workshop: Rosemary Chang, Margaret Wright, Gerald Farin, & Deborah Lockhart
- N. J. Higham, Handbook of Writing for the Mathematical Sciences, 2nd ed., SIAM, 1998
- Ilse Ipsen's CSRI talk of July 17, 2001
  http://csmr.ca.sandia.gov/csri/seminars/talk_ipsen.pdf
- Everyone who's ever given a really great talk!!

Remember. . .

- Know your audience
- Create a simple message
- Allow plenty of time to prepare your talk
- Practice! Practice! Practice!
- Don’t block the slides during the talk
- Speak slowly and clearly
- Don’t run over on time
- Have fun & learn from your mistakes!!

For More Information

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