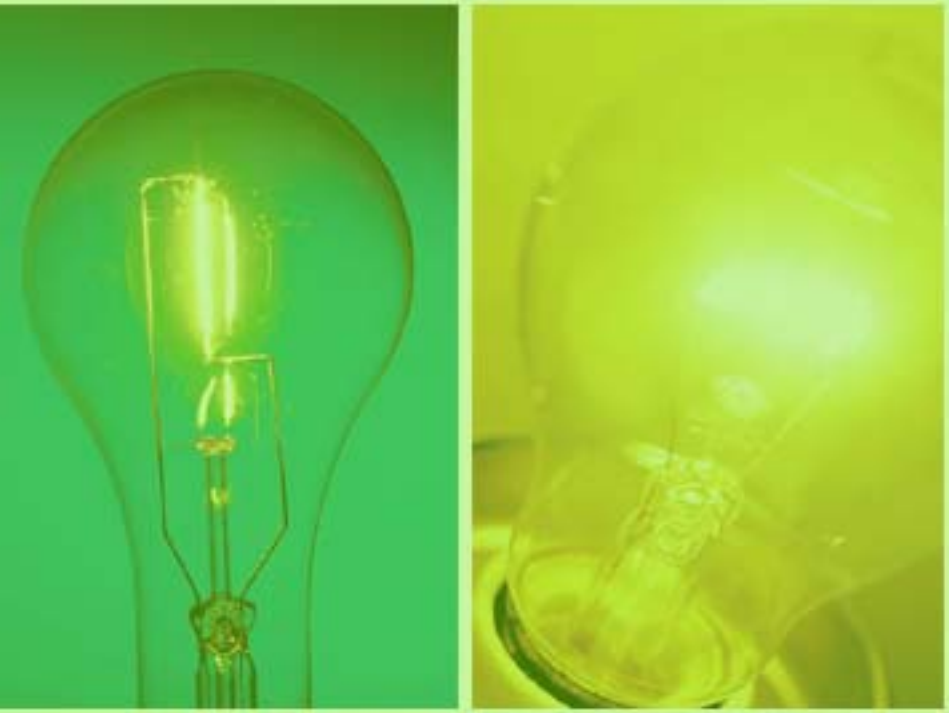
A Group Model Building Intervention for DEC



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Agenda

- DEC project description
- GMB intervention, step-by-step
- Simulation Model
- Results from the intervention
- The learning interface
- GMB take away
- Q&A

Project Goal

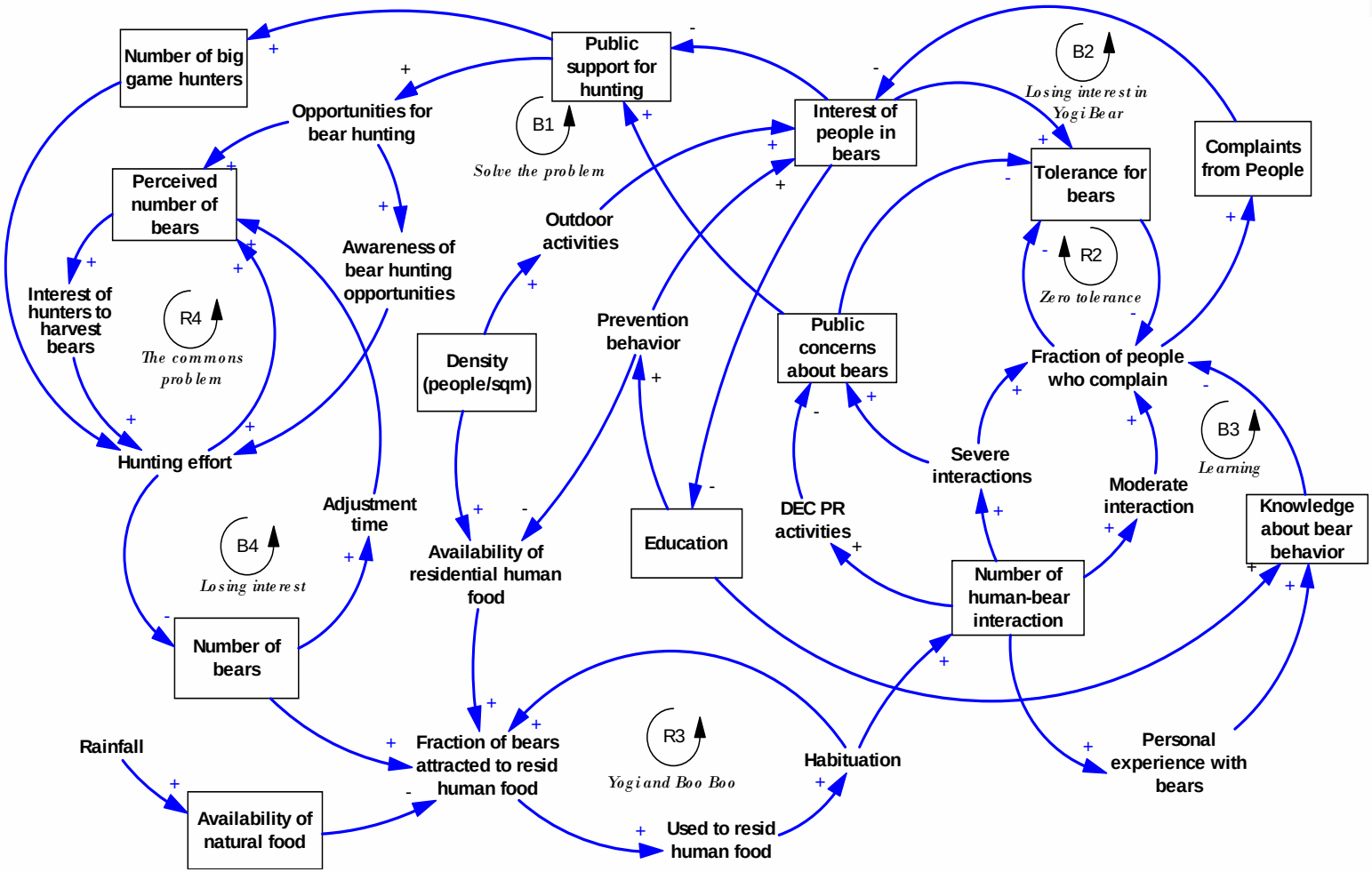
- Help a team of wildlife managers gain insights into a “messy problem” (Rittel & Webber 1973, Vennix 1999) and design effective strategies to deal with it.

- Evaluate GMB as a learning tool.

Desired Project Outcome

- Understanding of the system
- Consensus about problem definition
- Commitment to management actions
- Simulations for use in issue education

The System


Number of big game hunters
Public support for hunting
Opportunities for bear hunting
B1
Solve the problem
Interest of people in bears
B2
Losing interest in Yogi Bear
Complaints from People
Perceived number of bears
Tolerance for bears
Interest of hunters to harvest bears
R4
The commons problem
Awareness of bear hunting opportunities
Outdoor activities
R2
Zero tolerance
Density (people/sqm)
Prevention behavior
Public concerns about bears
Fraction of people who complain
B3
Learning
Hunting effort
Severe interactions
Moderate interaction
Knowledge about bear behavior
Adjustment time
B4
Losing interest
Availability of residential human food
Education
DEC PR activities
Number of human-bear interaction
Number of bears
Rainfall
Fraction of bears attracted to resid human food
R3
Yogi and Boo Boo
Habituation
Personal experience with bears
Availability of natural food
Used to resid human food

How to get there...

- Adaptation of standard approach (Hines 2001) for use in a group model building context.
- Use of “scripts” (Andersen and Richardson 1997)

Elicitation (of key variables, reference modes, etc.)

→ Formulation of dynamic hypotheses

→ Framing the problem (boundary setting)

Scripts in group model-building

- Definition of a script in the context of group model-building:

  "[a collection of]…small behavioral descriptions of pieces of a facilitated group exercise that move a group forward in a systems thinking intervention"

- The main work in planning for a GMB exercise is selecting the routines that the team will use
- Experience with a growing collection of scripts would support the group model-building processes
- Allows modelers to acquire, practice and extend

[Andersen and Richardson 97]

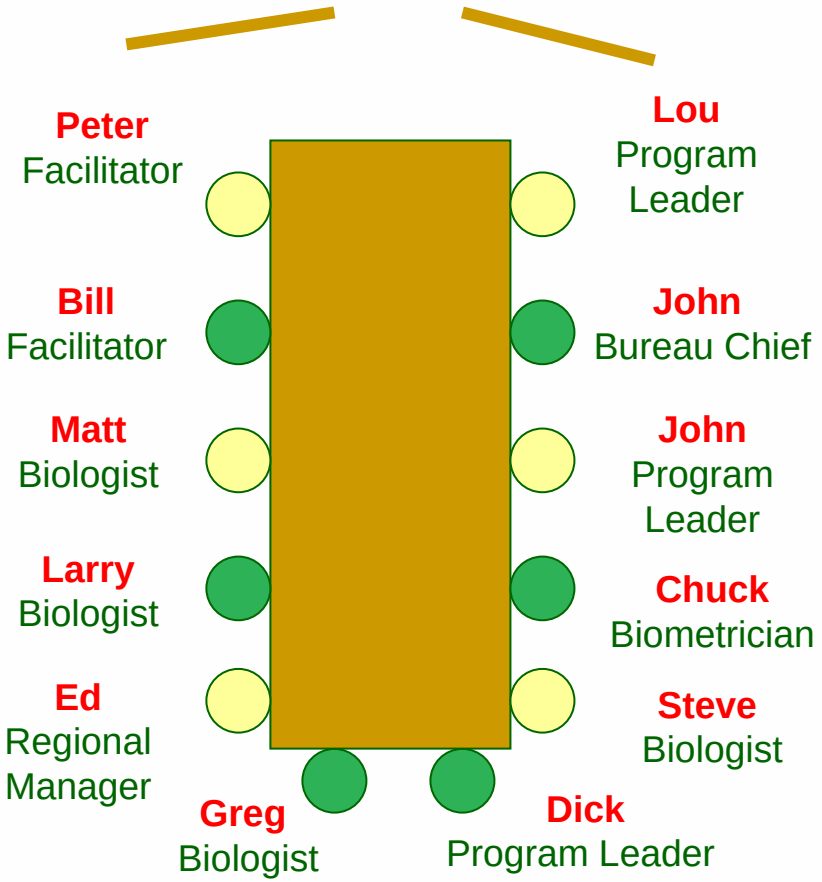
Different focus for group-building interventions

The Standard Method	GMB (AR 97, RA 95, V)
• Emergence • Loop-Based • Late modeling	• Concept Models • Stock-Flow approach • Early modeling

- How to interact with the client in order to achieve the desired objectives in a “messy problem”?
- How do we know what kind of scripts/routines to use!?

Knowledge Elicitation

"On-line" (4 Workshops)



"Off-Line" (Bill, Peter)

- Meeting preparations and initiation of scripts
  - Dynamic hypotheses
  - Modeling
- Regular working sessions to refine, quantify the model
- Interaction at 4 Bear Team meetings

1st Workshop

- Introduction to SD
- “Hopes and fears”
- “Graphs over time”
- “Actions past, present”
- “Management wish list”

Elicitation scripts for first meetings

- Eliciting Variables and Key Variables (on-line)
  "*Things that can go up or down approximately 10-70 variables*"
- Drawing Reference Modes (on-line)
  "*Hand-drawn approximate graphs of the chosen variables; pictures of what disturb the client hopes and fears"*
- Identifying the Verbal Problem Statement (on-line)
  "Verbally capturing the concern of the client is less important than the reference modes"
- Stating Momentum Policies (on-line)
  "A solution the client would like to implement now, if (s-)he had to make a decision Immediately"
- Theorizing Verbal Hypotheses (on-line)
  "Comprehensive causal chunks that explain parts of reference modes"

[Hines' Course Materials '02]

Agreement with the Team

- Tolerance for bears
- Hunting pressure on bears
- Bear population
- Sources of bear mortality
- Attitudes about bears
- Concerns about bears
- Problems with bears
- Habitat variables
- Level of DEC activities
- Outdoor recreation

We look for Dynamics...

- Number of bears
- Hunting opportunity
- Tolerance
- Education

- Negative interactions
- Public Concerns

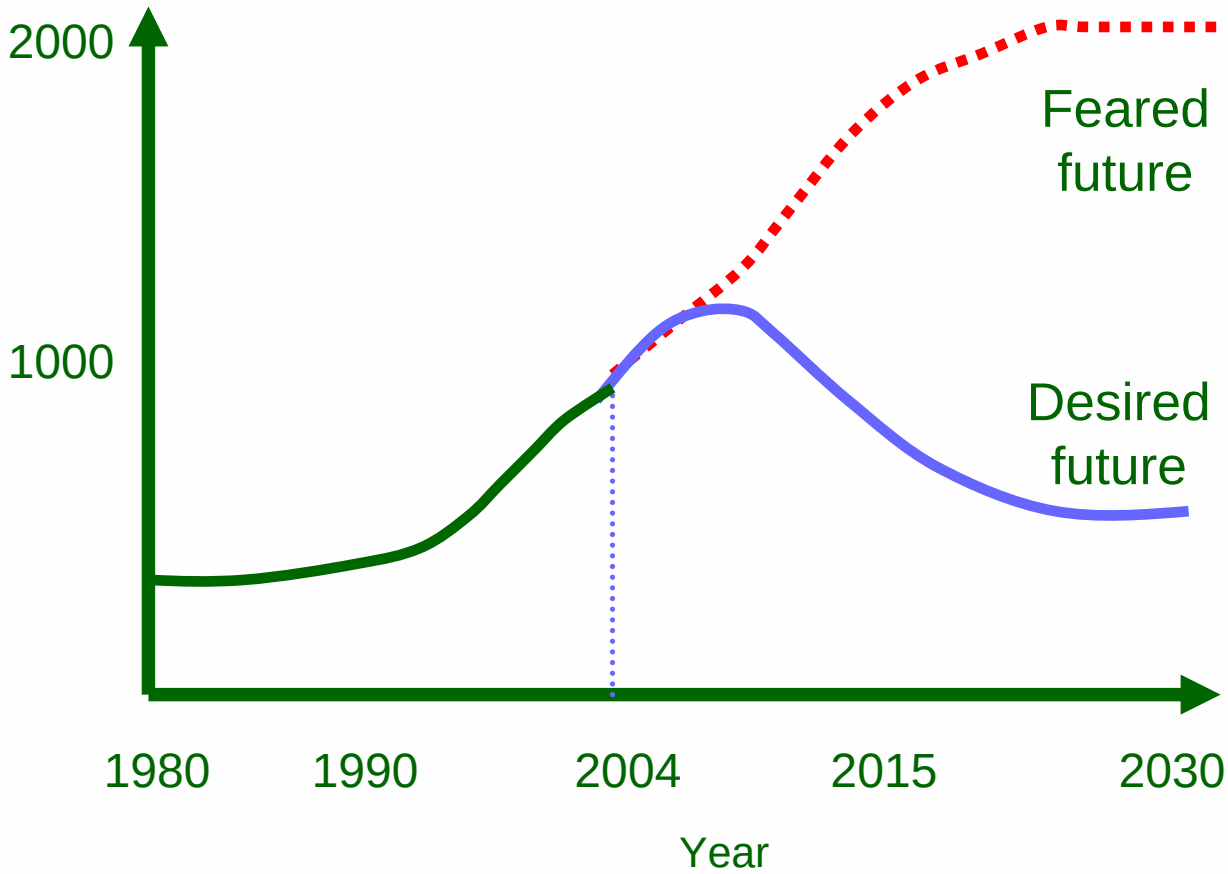
2nd Workshop

Discuss and refine:

- problem statement
- dynamic hypotheses
- causal loop diagram (loop by loop)

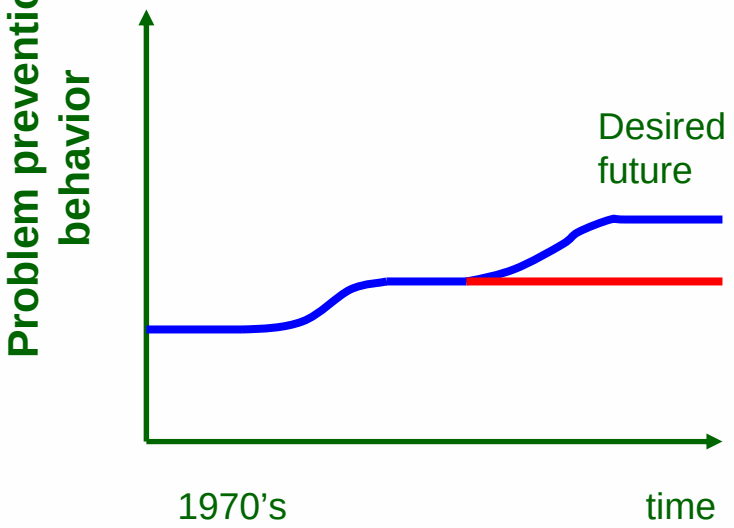
Problem Statement

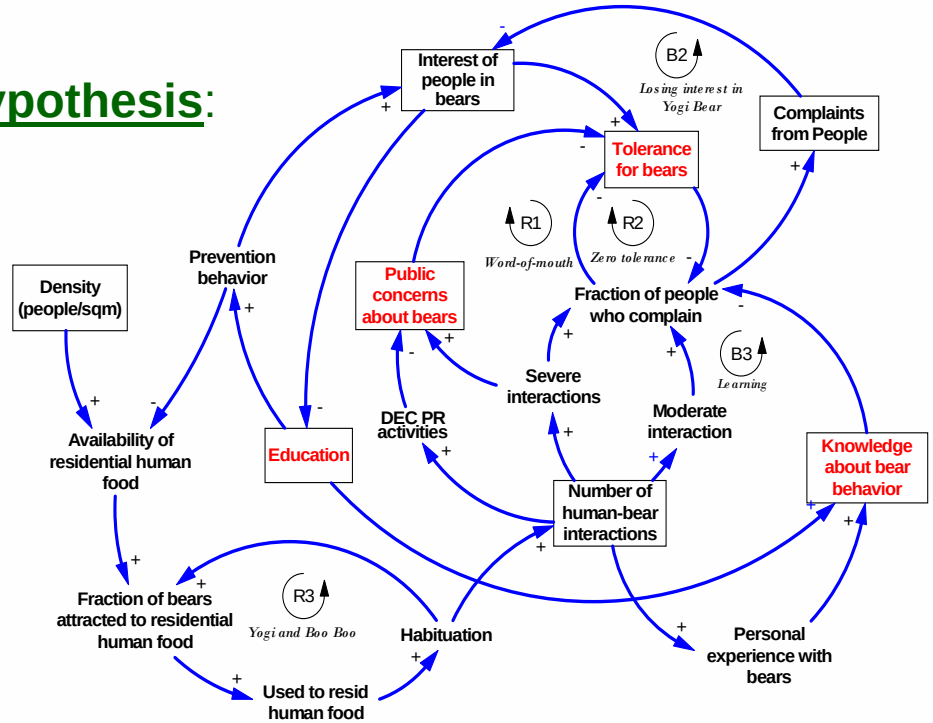
Negative human-bear interaction is increasing in New York, contributing to an increase in negative impacts. Rise in the number of complaints to DEC is one indication that negative impacts are increasing.



Script: formulation of dynamic hypotheses

Education hypothesis:

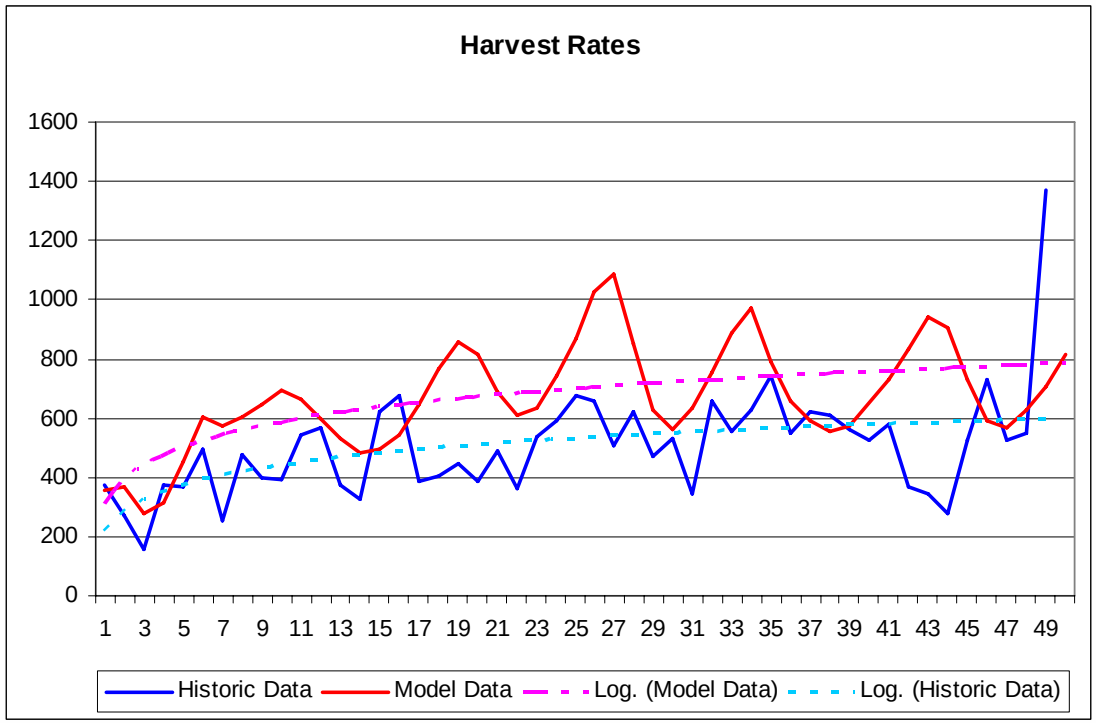




- A standard method script
- Description: Combine the verbal statements that provide the hypothized basic mechanisms for the reference modes into complete loops [also cf.Randers '80]
- Initiated off-line, discussed improved on-line

3rd Workshop

- Model calibration
- Structure revision
- Policy simulation



Comparison between historic data series of harvest rate with model data. The exponential trend line suggests that the model is getting close to real-world behavior.

Insights from Simulation

- Incremental change in hunting opportunity not an effective means to address the problem behavior.
- Increasing prevention education could be effective if campaigns increase coping skills.
- Most effective policy: ensure that agency has adequate resources to respond to complaints.

“The ultimate goal is system outcome improvement”

- Various valuable causal chunks - “Yes, But!”
  - Is hunting in fact a momentum policy?
  - Did the team build „awareness“ in order to really change activities in the desired direction!?
- “Changing mental models” ≠ “building confidence” ≠ “changing intensions”
  - They are all complementary but not identical and require different sets of scripts
  - For selecting scripts the knowledge about the specific problem is essential
- Confidence generation seemed to have contained at least two important stages:
  - Confidence in the approach – interactive scripts (between structure and behavior)
  - Confidence in outcomes – calibrated and specialist confirmation

The Simulation Model

- Model structure conceptualized with the client, i.e. the team gained confidence in the model (black box syndrome….)
- Early agreement on boundary issues
- Used to communicate with stakeholders

Limitations

- Lack of flexibility for policy testing using Vensim, i.e. one needs to understand the software….
- Graphs and sliders are not very appealing to be used as “flight simulator”
- Interface is too technical

- Remedy: Create dashboard to incorporate educational elements and better control elements of run policy tests

GMB Take Away

- Involve the client early in the process so he can gain ownership of the model
- Use scripts to uncover mental models of the client
- Frame the problem with dynamic hypothesis, for most clients don’t know what the problem is
- Build your model loop-by-loop, i.e. don’t rush into complex spaghetti diagrams