

# **Navigating between large-scale assessment and classroom assessments**

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# Outline

- Classroom and large-scale assessment: the current problem
- The idea of a Learning Progression
- A 3-part strategy for resolving the problem

# Linking summative to formative...

- Formative Assessment: A Definition:

*An assessment activity is formative if it can help learning by providing information to be used as **feedback**, by teachers, and by their students, in assessing themselves and each other, to modify the teaching and learning activities in which they are engaged.*

# Linking summative to formative...

- Summative Assessment : A Definition

*An assessment activity is summative insofar as it is being used to provide a summary of what a student knows, understands or can do, and not to help by providing feedback to modify the teaching and learning activities in which the student is engaged.*

# What is the problem?

- Effects of summative (state/national) test on the curriculum and instruction.

# Another aspect of the Problem:

## *The wish of large-scale national testing programs*

- To have the results of the large-scale tests be useful “diagnostically” to teachers in the classroom
- Asked for by State Testing Directors, promised by testing companies ...

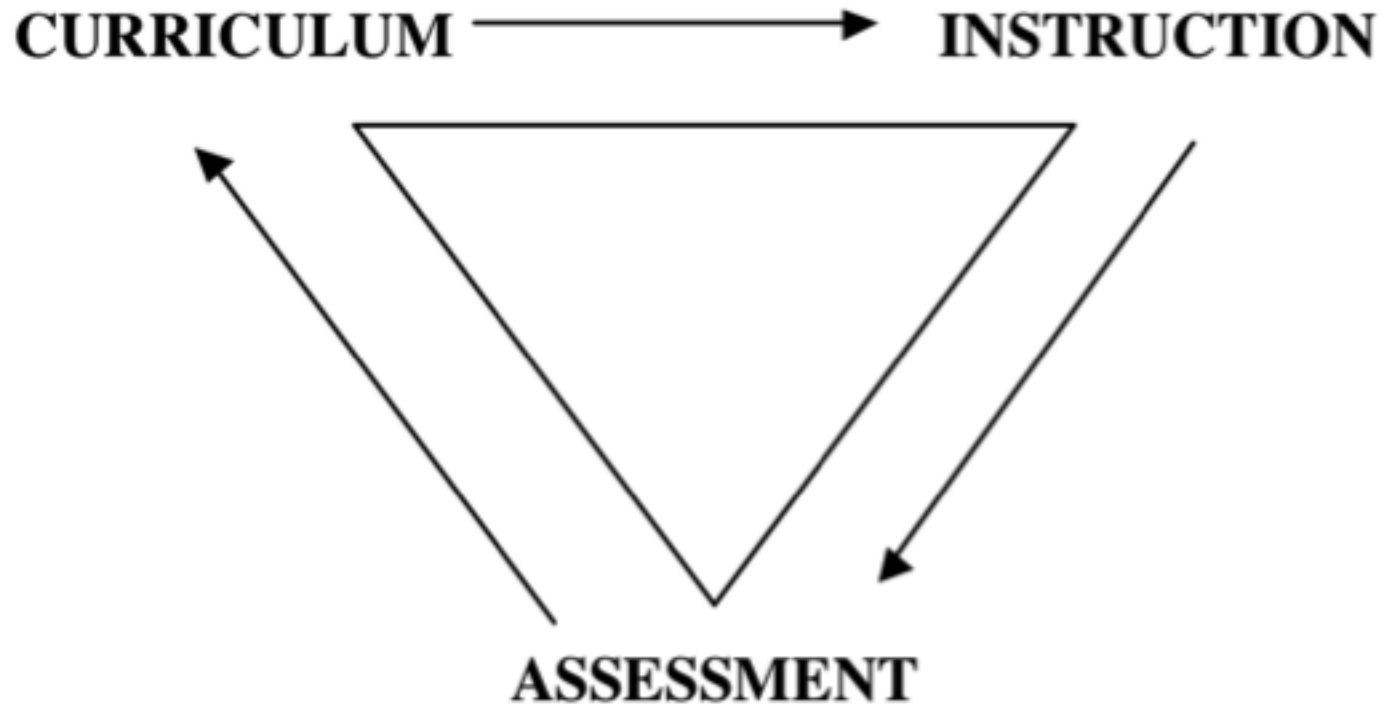
# *The wish of large-scale national testing programs:*

## *Diagnostic State Tests*

- A common “solution:”
  - give raw scores for subscales
  - avoid appearance of having to report uncertainty (i.e., raw scores don’t have std. errors!)
- Another “solution:”
  - make little<sup>1</sup> copies of the state test
  - administer regularly throughout year
  - “benchmark” test

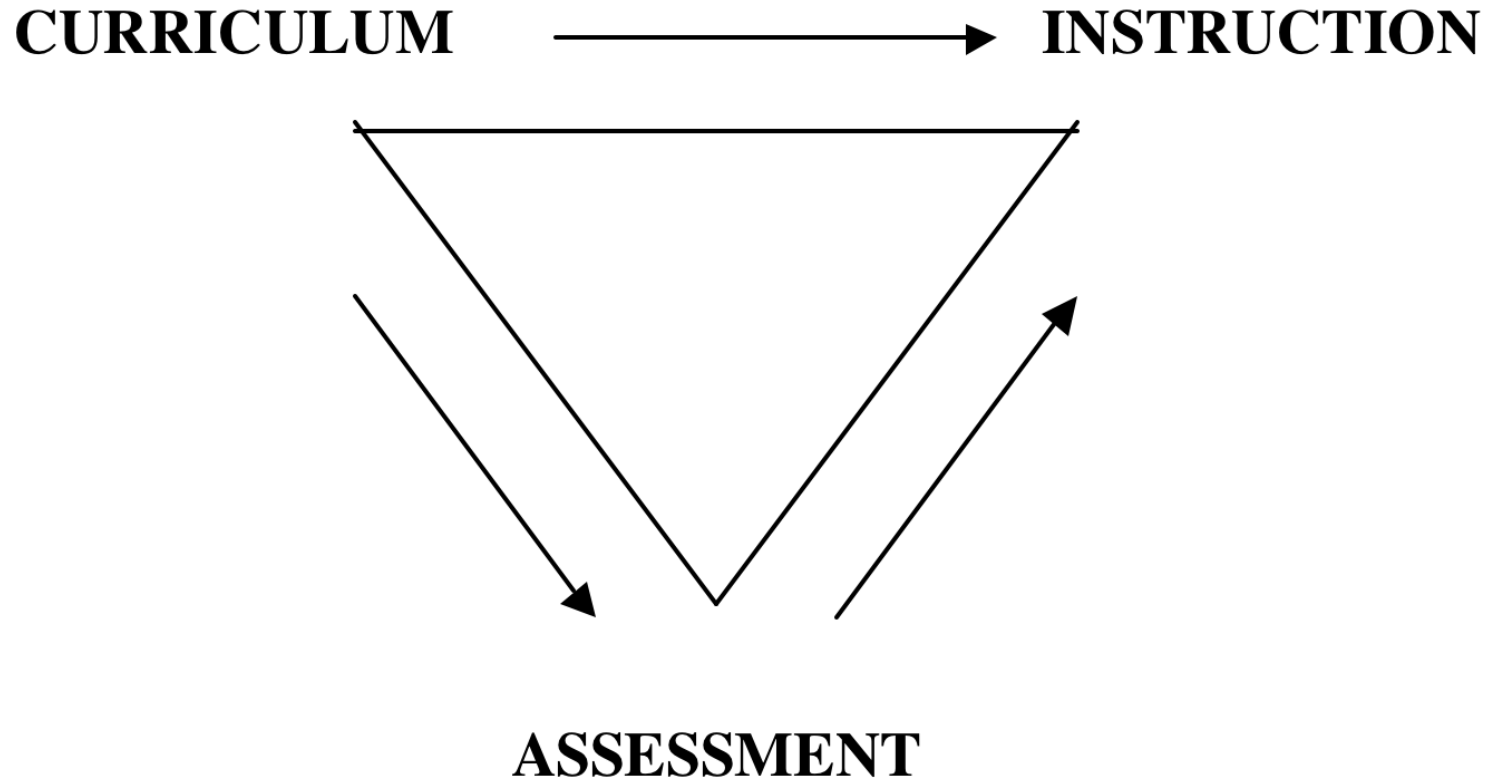
<sup>1</sup> or, in case of OR, full copies!

# Consider: The Triangle of Learning: standard layout





# The “vicious” triangle



# E.g., Consequences

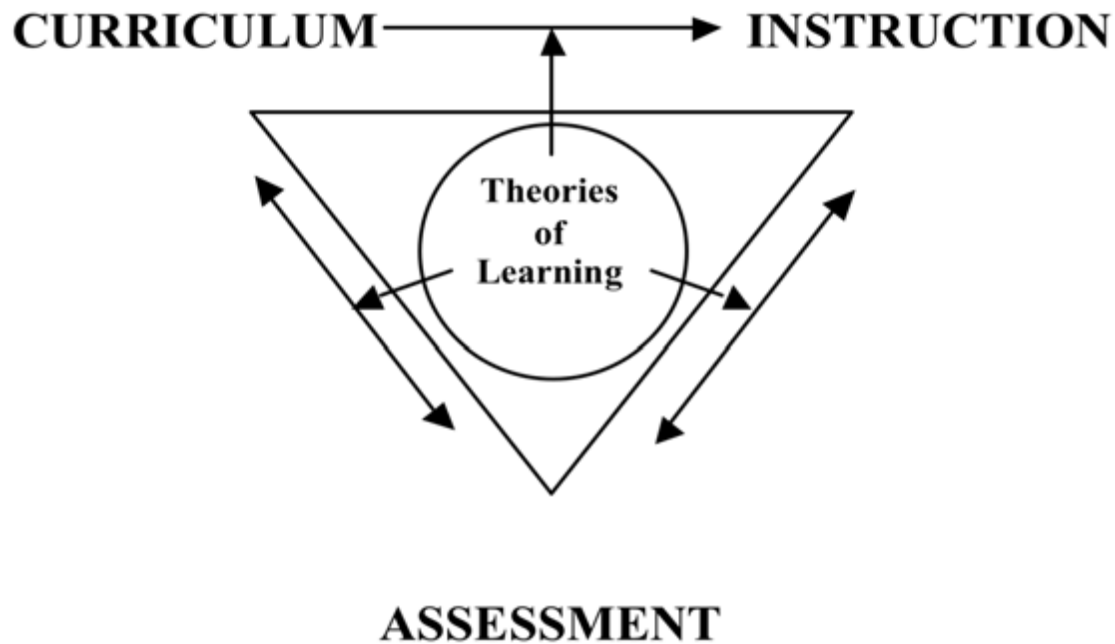
- “ When it becomes so whittled down to specifics, that’s when it kills... as a teacher I don’t mind marking, its when you are marking in a very narrow way, where you are not allowed to make assumptions, that deadens...Especially with the KS3 tests. You prepare them in a very specific way and you boost them and you give them strategies and you programme them to do things in a certain way. And that is not the way I would naturally teach.” (Kate)

(from Harrison et al., 2007)

# E.g., Consequences

- recent *Teachers Network* survey
  - [http://teachersnetwork.org/tnli/survey\\_highlights.htm](http://teachersnetwork.org/tnli/survey_highlights.htm)
- NCLB testing:
  - "somewhat useful" 37%, "not at all" helpful 42%
  - encourages rote drill 40%
  - eliminate curriculum material not tested 44%
  - encourages them to improve their teaching effectiveness 3%
  - an effective way to assess the quality of schools 1%
  - "strongly agree" that NCLB with its Adequate Yearly Progress (AYP) goals has contributed to teacher burnout 69%

# The Triangle of Learning: a formative approach



# How do we make this happen?

## Thinking about alternatives

- “A mile wide and an inch deep”
  - now-classic criticism of US curricula in Mathematics and Science
- Need to find a more efficient way to use item information than by testing *every* standard with multiple items
- Need for standards to be interpretable by educators, policy-makers, etc.
- Need to enable long-term view of student growth

# Outline

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- **The idea of a Learning Progression**
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# Learning progressions

- *Learning progressions are descriptions of the successively more sophisticated ways of thinking about an important domain of knowledge and practice that can follow one another as children learn about and investigate a topic over a broad span of time. They are crucially dependent on instructional practices if they are to occur. (CCII, 2009)*
  - Aka learning trajectories, progressions of developmental competence, and profile strands
- A progression must be articulated in ways that coordinate efforts across the axes of discipline, learning, instruction and assessment. (Lehrer & Wilson, 2011)
- Need to engage in curriculum debate about which learning progressions are most important
  - Try and choose them so that we end up with fewer standards per grade level

# Example

## Assessing Data Modeling and Statistical Reasoning (ADM) project

PIs: Rich Lehrer & Leona Schauble (both Vanderbilt U),  
Mark Wilson (UC Berkeley)

- Multi-year, multidisciplinary collaborative of teachers, learning science and assessment experts
- Designed “a developmental perspective on learning” - learning progression with 7 relational construct maps
- Used “reformed curriculum” – conjecture-based whole-class discussions within instruction
- Embedded “new ideas about assessment” into everyday instruction



# ADM project

Data modeling involves coordination among six dimensions, plus a contextual dimension:

(**DaD**) Data Display (representational competence),

(**MRC**) Meta-Representational Competence

(comparing and considering trade-offs among displays),

(**CoS**) Conceptions of Statistics (characterizing distributions),

(**Cha**) Chance,

(**MoV**) Modeling Variability (constructing models of chance variation)

(**Ini**) Informal Inference (model-based views of inference)

(**ToM**) Theory of Measurement.

# Learning Progressions: What teachers say...

- *those judging (i.e., teachers of English) have a construct - a sense of what constitutes the relevant quality - which cannot be reduced to an explicit and atomised list.*
- *a clear perception of what it means to be 'good at English'*
- *core characteristics: creativity, flair, insight, effective expression and communication*

*(Harrison et al, 2007)*

# Learning Progressions: What teachers say...

- Teacher practices based on a learning progression
  - *As I had visualised where I wanted students to go and how to get there, I was more comfortable in predicting where to go and specific in my interventions*

(Cowie et al., 2007)

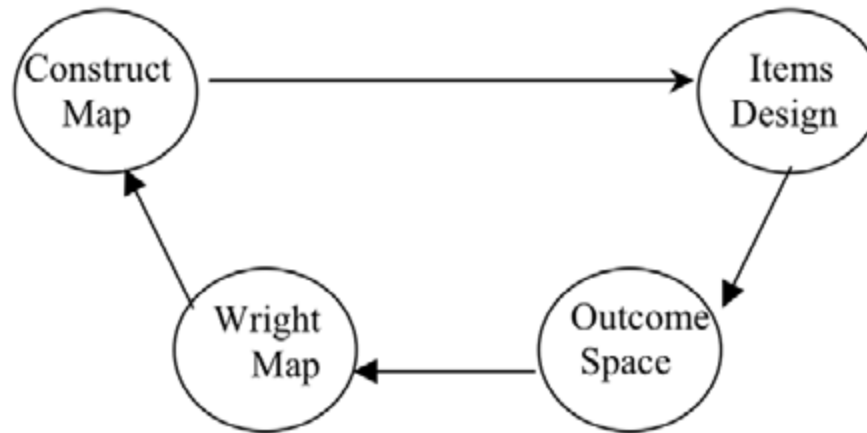
# Outline

- Classroom and large-scale assessment: the current problem
- The idea of a Learning Progression
- A 3-part strategy for resolving the problem
  - One construct at a time: The BEAR Assessment System
  - Building an Outcome Progression
  - Designing Large-Scale Assessments

# BEAR Assessment System

Principle 1:  
Developmental Perspective

Principle 2:  
Match Between Instruction and  
Assessment



Principle 4: Evidence of High  
Quality

Principle 3:  
Management by Teachers

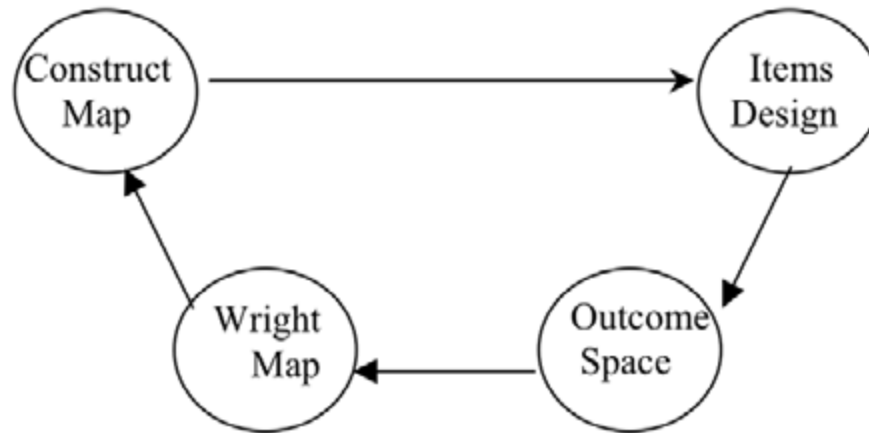
Construct Map for:  
*Conceptions of  
Statistics*

- **CoS4** - Investigate and anticipate qualities of a sampling distribution.
- **CoS3** - Consider statistics as measures of qualities of a sample distribution.
- **CoS2** - Calculate statistics.
- **CoS1** - Describe qualities of distribution informally.

# BEAR Assessment System

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# Open Assessment Prompt

Students received their final grades in Science today. In addition to giving each student their grade, the teacher also told the class about the overall class average.

Student	Final grades
Robyn	10
Jake	9
Calvin	6
Sasha	7
Mike	8
Lori	8

When the teacher finished grading Mina's work and added her final grade into the overall class average, the overall class average stayed the same. What could Mina's final grade have been? (Show your work).



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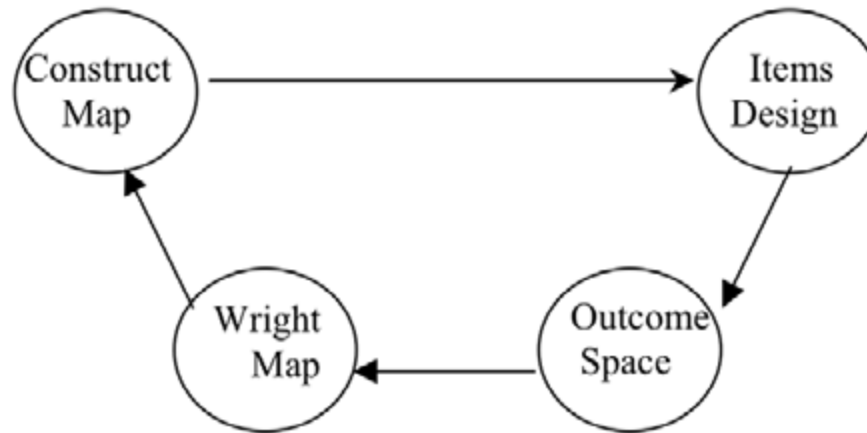
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$$48/6 = 8$$

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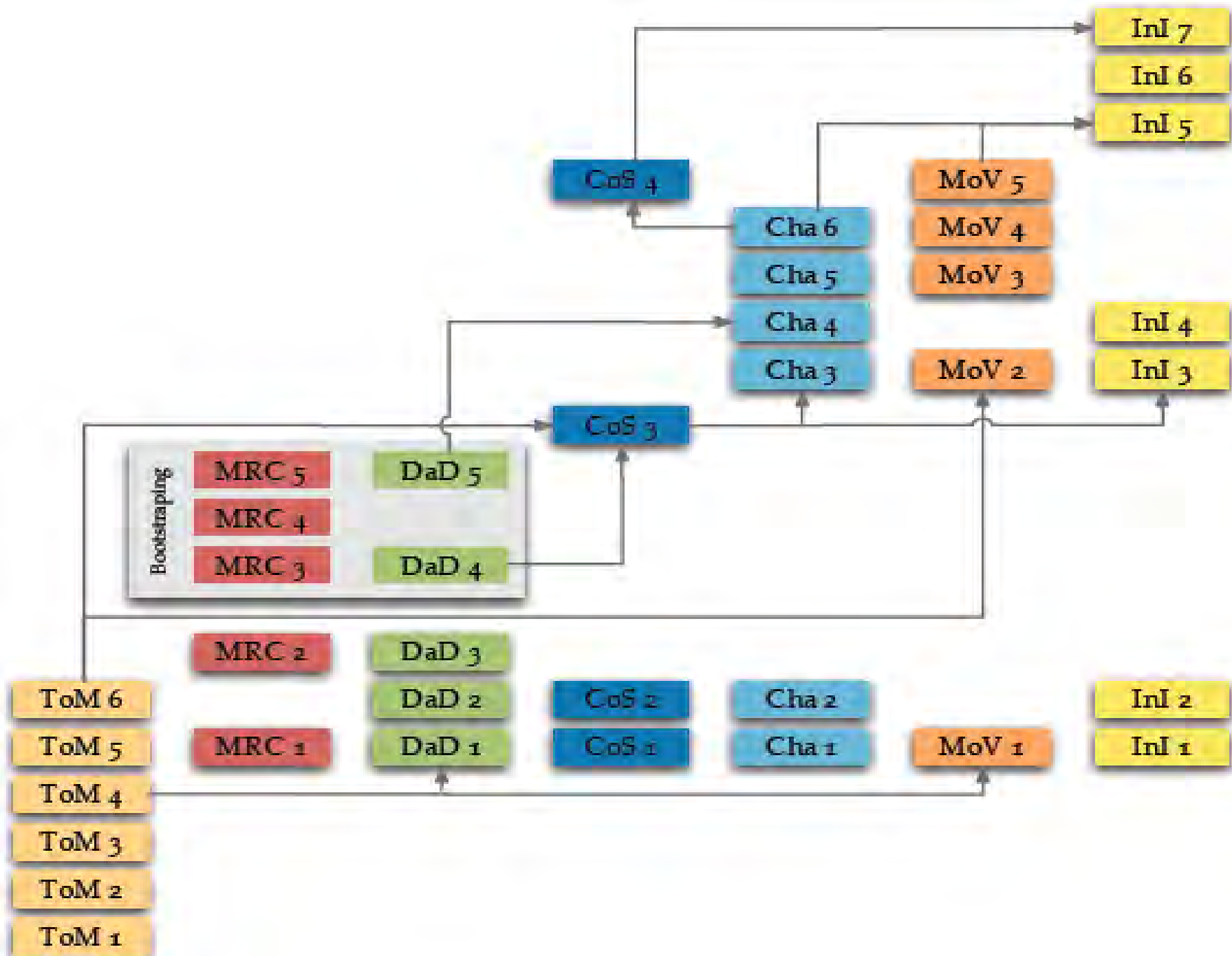
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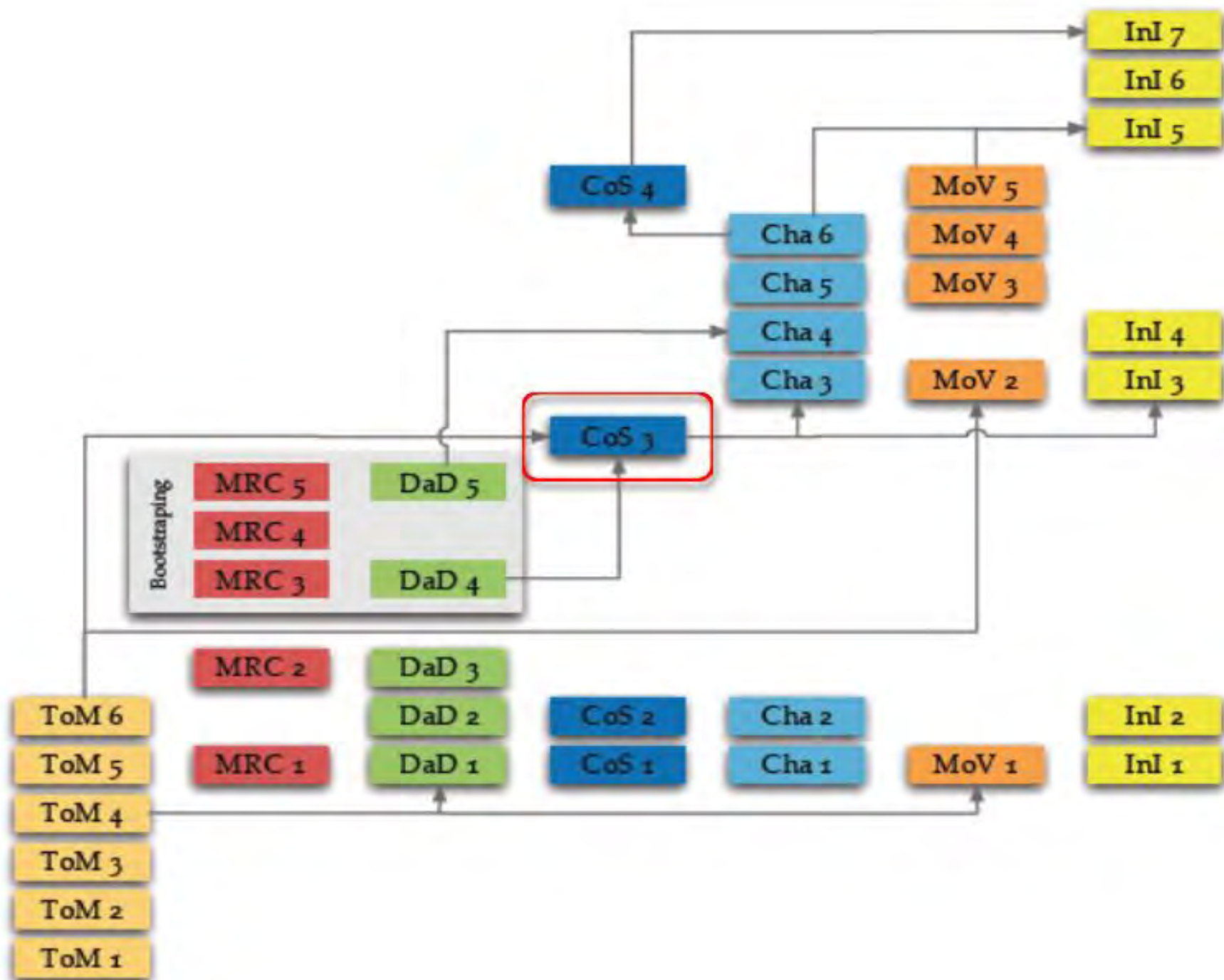
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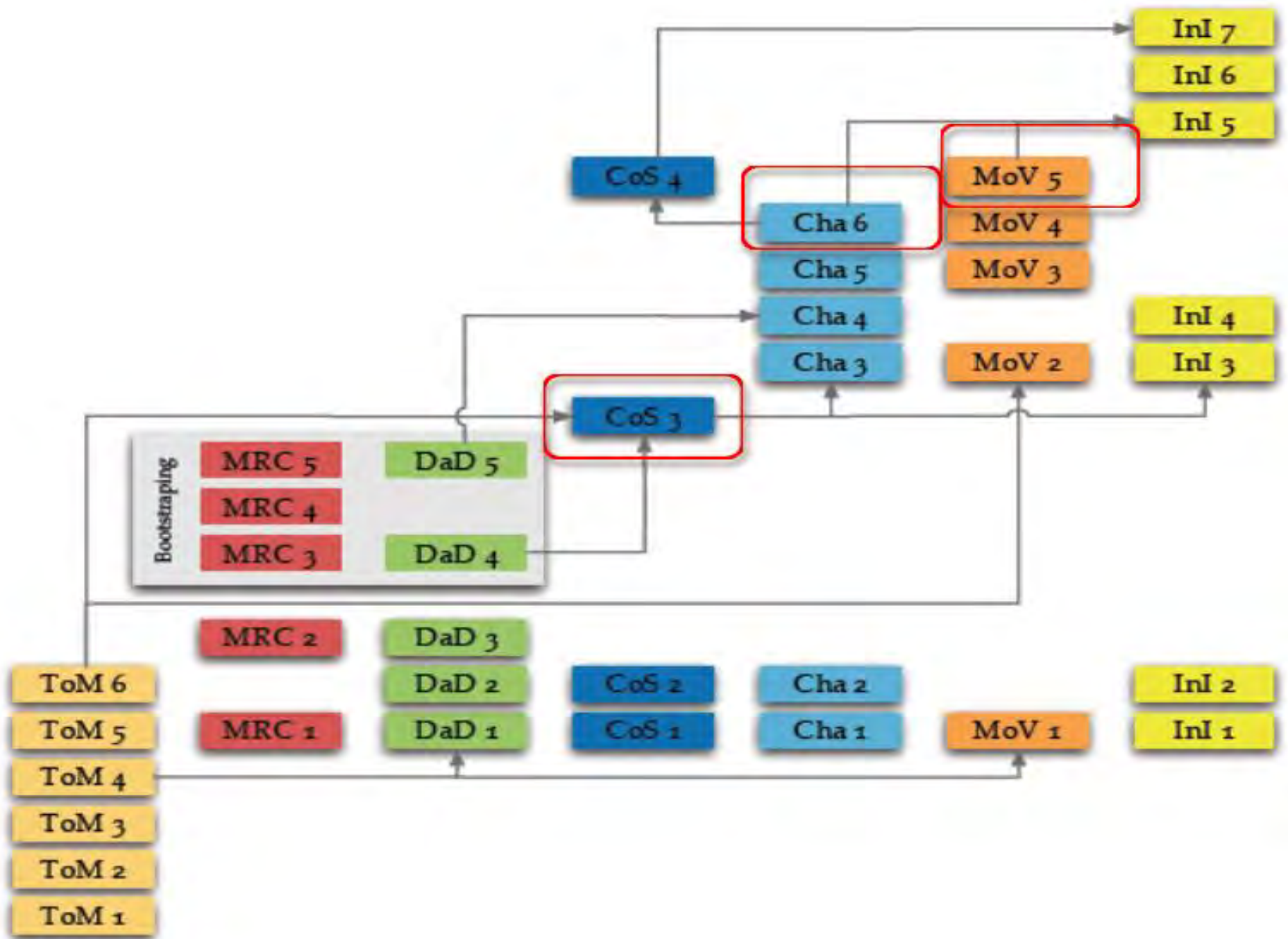
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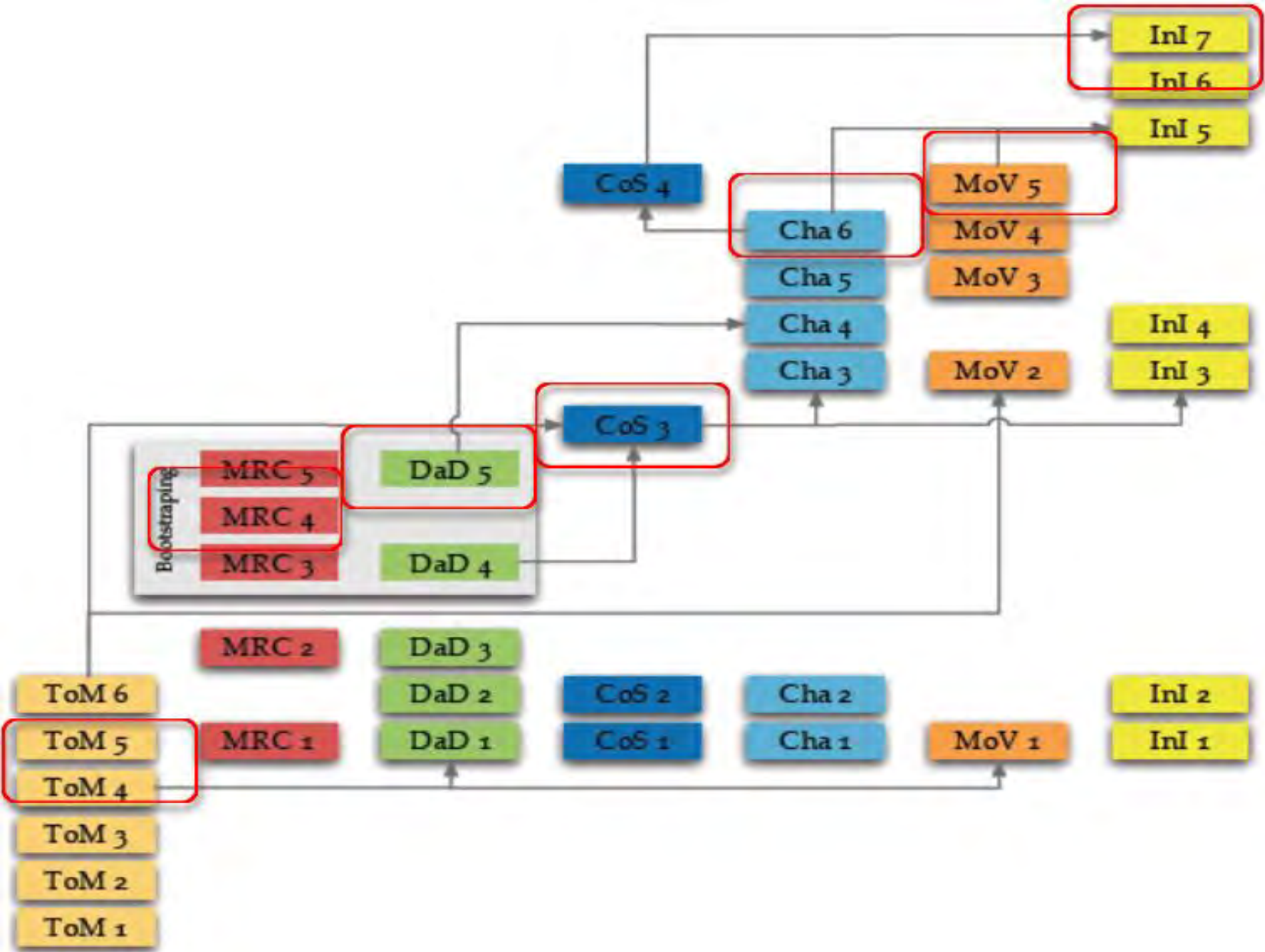
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# Then the large scale test becomes ...

a *derived measure* based on the sampling design of the levels across the 7 constructs of ADM

Reliability can be controlled by lighter/heavier sampling of items

A “construct map” can be developed in a post-hoc way  
(might look similar to the PISA “defined variable” concept)

Can be combined with other derived measures from other age or grade-appropriate Learning Progressions.

# How are learning progressions a solution to this problem?

(of the relationship between large-scale and classroom tests)

- *Curriculum Politics*. Everyone wants to add their special topic into the standards. E.g., Nanoscience
- Strategy: Need to express the curriculum at a grain-size that is manageable and debatable.
- Solution: Each subject area has *just a few* learning progressions each year, and they are articulated across years.
- Difficulty: Biting the bullet about teaching LESS so that students learn MORE!

# How are learning progressions a solution to this problem?

(of the relationship between large-scale and classroom tests)

- *Classroom Assessment*. Teachers need to have a guide for their understanding and planning
- Strategy: Learning Progressions do indeed specify targets for assessment that are at an appropriate level for planning at the classroom level.
- One solution: Build outcome progressions based on *progress variables* designed using the BEAR Assessment System
- Difficulty: Needs a lot more than test developers usually would expect
  - Similar effort to creating a curriculum.

# How are learning progressions a solution to this problem?

(of the relationship between large-scale and classroom tests)

- *Large-Scale Assessment*. Must not be inconsistent with classroom assessment, YET must not “squeeze” classroom assessment.
- Strategy: Needs a process for it to be defined as a *derived measure* from the classroom assessments
- Our solution: Identify “knot points” in learning progressions—sample these to create the “blueprint” of the large-scale assessments
  - Difficulty: Not yet enough well-researched and well-assessed learning progressions

# How is are learning progressions a solution to this problem?

(of the relationship between large-scale and classroom tests)

- *Relationship.* Classroom assessments => large-scale assessments
- Strategy: Organise classroom assessments via learning progressions, then derive large-scale assessments using sampling plan based on learning progressions
- Our 3-part solution:
  - (a) Build classroom assessments one construct at a time
  - (b) Assemble them into Learning Progressions
  - (c) Structured sample from LPs =>  
Large-scale assessments

# Conclusions

- Learning Progressions *can* provide a way to develop
  - Classroom assessments
  - Large-scale assessments
  - The necessary co-ordination between the two
- However, the assessment component of a learning progression, the *Outcome Progression*, needs to be designed to allow this to occur.
- The “Construct Maps” of the BEAR Assessment System can be used to “tile” a learning progression, and also provide a basis for both classroom and large-scale assessment.

# Conclusions

- Challenges:
  - need to develop learning progressions across important curricula
  - need to have the resulting political/curriculum debates
  - need to develop assessments for those learning progressions
  - need to design new measurement approaches for “links” across dimensions
  - need to re-think “blueprints” for large-scale assessments to base them on learning progression ideas



# Conclusions

- *Methodological Issues*—New variables to measure
- Some have their own interesting features
  - E.g., building knowledge through social networks
- To make “room,” may have to “double-up”
  - i.e., measure content and process together
  - E.g., mastery of networking while learning science
- Opportunity offered by new technological developments
  - E.g., tracking networking moves within groups

# Conclusions

- *Curriculum Issue*—Curricula, expressed as learning progressions, become testable hypotheses
- Can go beyond the “horse-race” evaluations of NCLB-type legislation
- Can hypothesize alternative ways to structure curricula
- Carry out investigative research on learning progressions, and test alternatives, including alternative outcome progressions

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