CSCL 2011

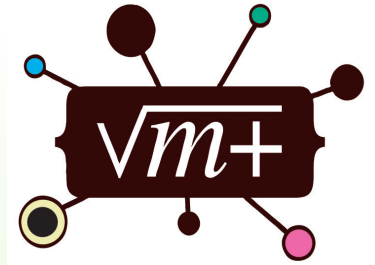# "Seeing what we mean: Co-experiencing a shared virtual world"

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Overview

- **This paper is based on the Virtual Math Teams project, including the 3 dissertations of the co-authors**
- **We present an alternative to the view of Common Ground based on convergence of mental models**
- **We present a case study from VMT Spring Fest 2006, Team C, Session 3.**
- **We analyze how 3 students establish and maintain intersubjective understanding of a math problem, which they solve as a group**

The Problem of Intersubjectivity and Common Ground

- The precondition of collaborative learning is that the participants understand each other enough to accomplish their work
- This includes tacit background knowledge and explicit shared understanding of the current topic
- In cognitive science, grounding of shared understanding is treated as the explicit comparison of mental models or internal opinions; in our analysis, it is the result of interactional work in which a shared world is created and various methods are used to ensure a sharing of this world

The Grounding of Intersubjectivity : Physically Embodied Being-in-the-World

- We all find others and ourselves within one world.
- We learn about and experience the many dimensions of this world together, as we mature as social beings.
- The "problem" of establishing intersubjectivity is a pseudo-problem in most cases.
- Human existence is fundamentally intersubjective from the start.
- We understand the world in which we are embodied with other people and cultural artifacts as a shared world.

The Issue of Intersubjectivity in Virtual (CSCL) Worlds

The Practical Issue of Intersubjectivity Online

- **How do people who meet online create a shared world in which they can understand things the same?**
- **How do their online actions (chat and drawing) build a joint problem space of actors, places, times, social relations, semantics, artifacts and group members?**
- **How do they raise issues of understanding, repair misunderstandings, share perspectives?**
- **How does the group interaction establish a shared discourse context to support intersubjectivity without physical embodiment?**

Opening a Shared World

137 5/16/06 7:15:08 PM EDT: So do you want to first calculate the number of triangles in a hexagonal array?

qwertyuiop 5/16/06 7:15:45 PM EDT: What's the shape of the array? a hexagon?

137 5/16/06 7:16:02 PM EDT: Ya.

qwertyuiop 5/16/06 7:16:15 PM EDT: ok...

Jason 5/16/06 7:16:41 PM EDT: wait-- can someone highlight the hexagonal array on the diagram? i don't really see what you mean...

Jason 5/16/06 7:17:30 PM EDT: hmm.. okay

qwertyuiop 5/16/06 7:17:43 PM EDT: oops

Jason 5/16/06 7:17:44 PM EDT: so it has at least 6 triangles?
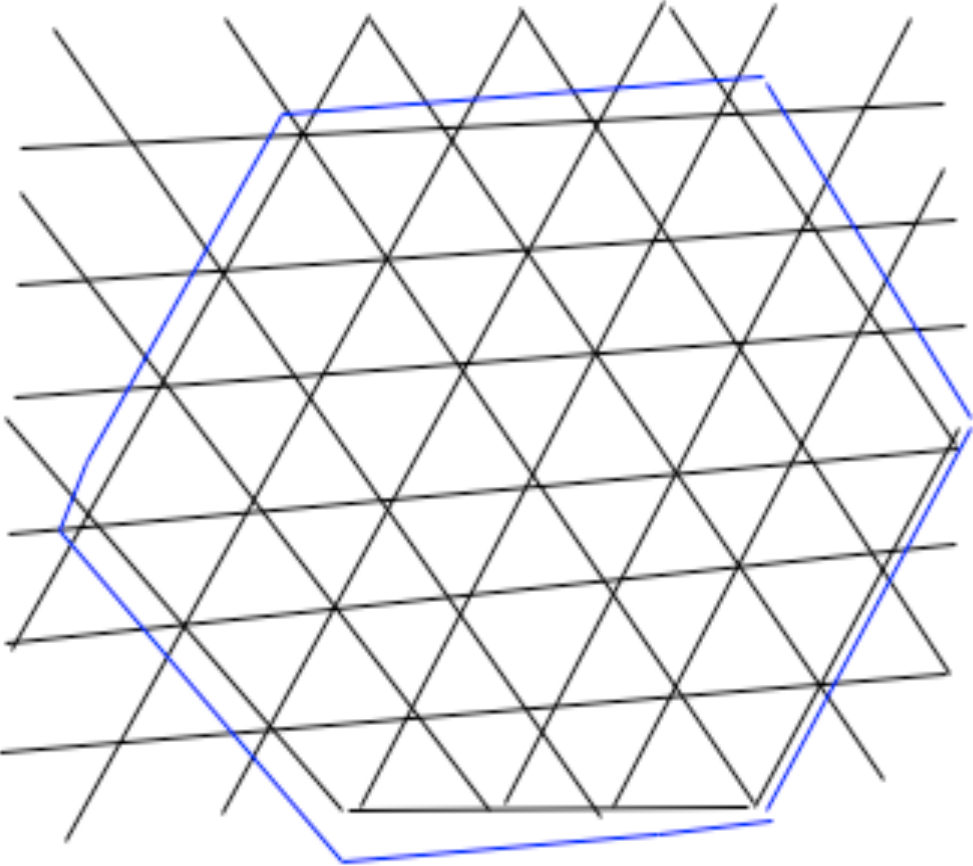
Jason 5/16/06 7:17:58 PM EDT: in this, for instance

Opening a Shared World

Orienting to a Shared Object

137 5/16/06 7:18:53 PM EDT: **How** do you color lines?

■

Jason 5/16/06 7:19:06 PM EDT: there's a little paintbrush icon up at the top

■

Jason 5/16/06 7:19:12 PM EDT: it's the fifth one from the right

■■

137 5/16/06 7:19:20 PM EDT: Thanks.

Jason 5/16/06 7:19:21 PM EDT: there ya go 🙂

■■■■

137 5/16/06 7:19:48 PM EDT: Er... That hexagon.

Seeing "As" a Shared Pattern

Jason 5/16/06 7:20:02 PM EDT: so... should we try to find a formula i guess

Jason 5/16/06 7:20:22 PM EDT: input: side length; output: # triangles

qwertyuiop 5/16/06 7:20:39 PM EDT: It might be easier to see it as the 6 smaller triangles.

137 5/16/06 7:20:48 PM EDT: Like this?
■■■

qwertyuiop 5/16/06 7:21:02 PM EDT: yes

Jason 5/16/06 7:21:03 PM EDT: yup
■■

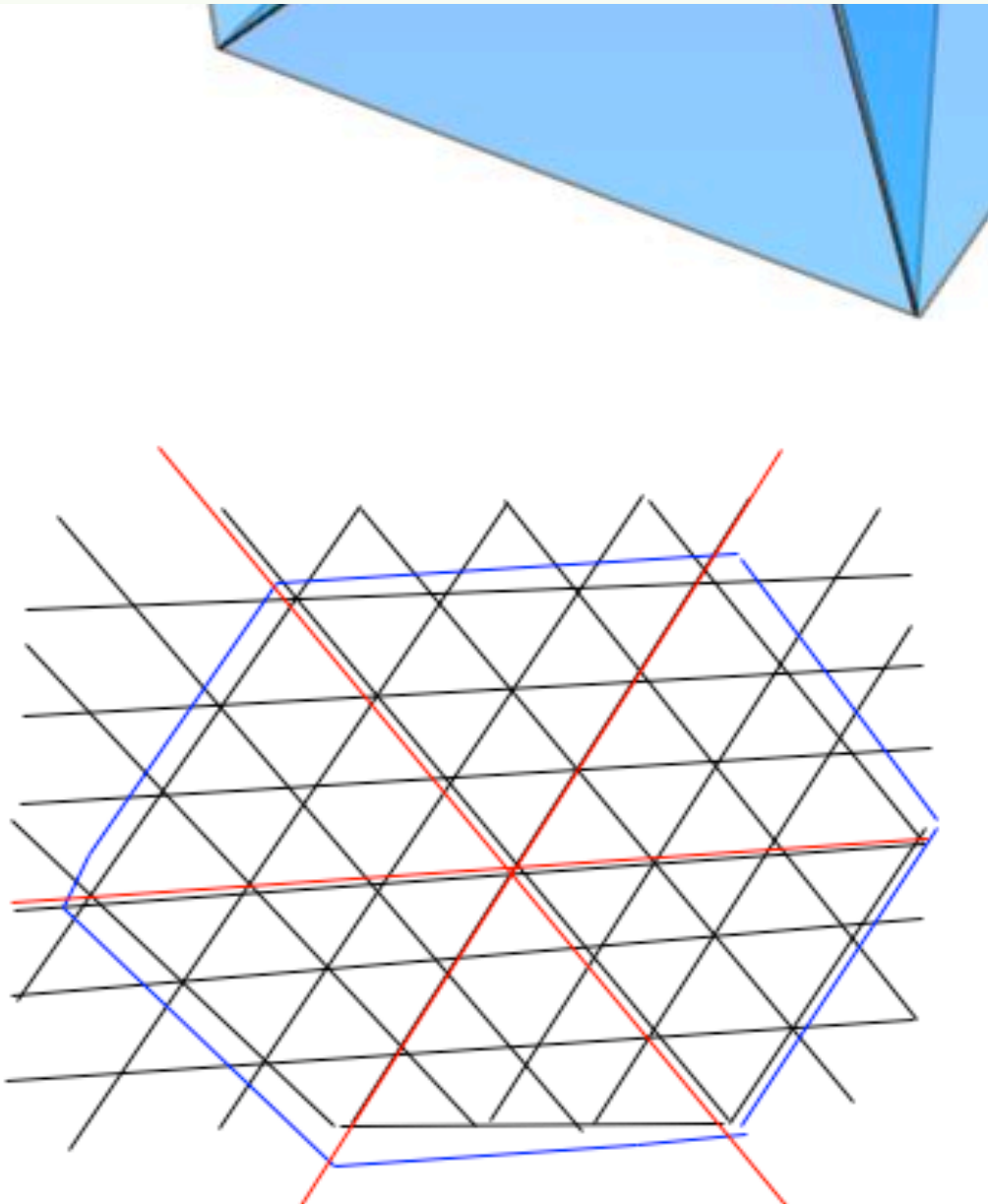**qwertyuiop** 5/16/06 7:21:29 PM EDT: side length is the same...

Jason 5/16/06 7:22:06 PM EDT: yeah

Jason 5/16/06 7:22:13 PM EDT: so it'll just be x6 for # triangles in the hexagon

137 5/16/06 7:22:19 PM EDT: Each one has 1+3+5 triangles.

Building Knowledge Together

137 5/16/06 7:23:17 PM EDT: It equals $1+3+...+(n+n-1)$ because of the "rows"?

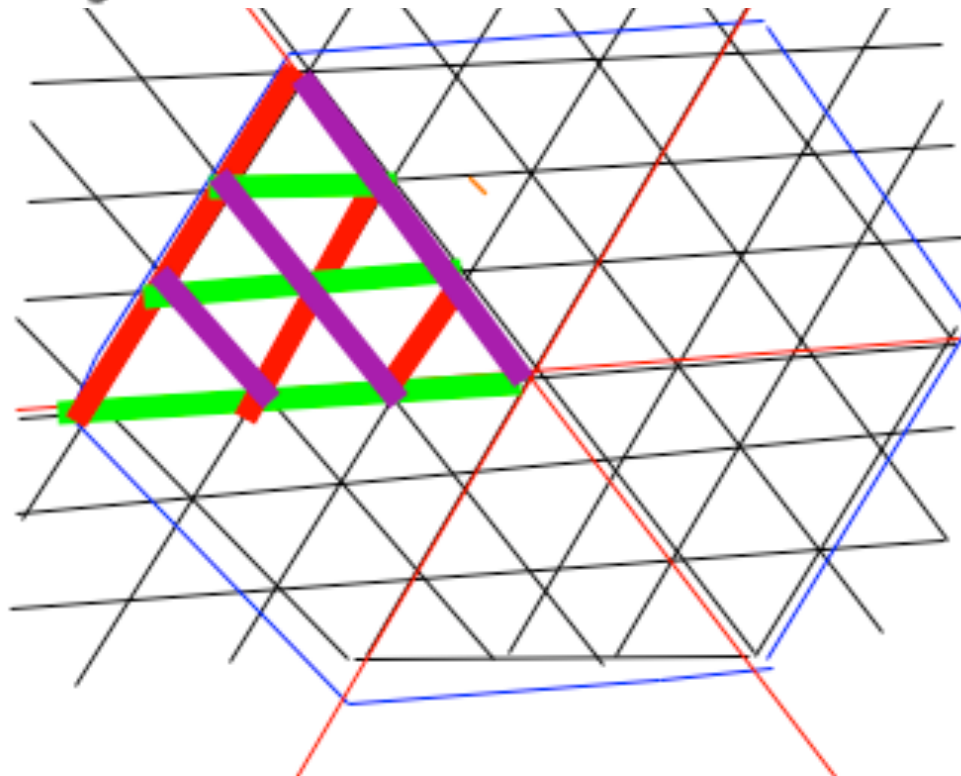**qwertyuiop** 5/16/06 7:24:00 PM EDT: yes– 1st row is 1, 2nd row is 3...

137 5/16/06 7:24:49 PM EDT: And there are n terms so... $n(2n/2)$

t **137** 5/16/06 7:25:07 PM EDT: or n^2

Jason 5/16/06 7:25:17 PM EDT: yeah

Jason 5/16/06 7:25:21 PM EDT: then multiply by 6

t **137** 5/16/06 7:25:31 PM EDT: To get $6n^2$

Group Cognition in Math

- **Open a shared world with an external representation – establish a joint problem space that is visually shared**
- **Orient everyone to a specific object for mutual discussion**
- **Make a particular pattern visually relevant**
- **Discuss the pattern in words**
- **Signify the pattern in mathematical symbols and manipulate them**
- **Indicate that everyone is together at each step**

Conclusions about Group Cognition in this CSCL Case

- The group works on maintaining a shared view of a joint problem space
- They use questions, proposals, requests, repairs, pointing, outlining, visual emphasis, verbal description, terminology, math symbols
- They confirm mutual understanding by agreement or by demonstration
- The problem solving is accomplished by the group
- Each participant understands the resources, methods and steps well enough to potentially use them individually in the future
- They learn effective ways of "seeing-as"

Implications for CSCL

- **It is possible to observe and analyze in chat logs how groups establish and maintain intersubjectivity and accomplish group-cognitive tasks**
- **Analysis can show how features and affordances of the CSCL media and environment are used to support intersubjectivity and group cognition: persistent text chat, shared drawing board, line color & thickness, pointing tool, etc.**
- **CSCL environments can support virtual Being-in-the-World-Together in modes different from physical embodiment**

For Further Information:

- *"Group Cognition"* **(2006, MIT Press)**
- *"Studying Virtual Math Teams"* **(2009, Springer, now in paperback)**
- *Gerry Stahl's e-Library* **(collections of papers free for iPad, Kindle, PDF or low-cost print-on-demand): GerryStahl.net/elibrary**

- **This paper: GerryStahl.net/pub/cscl2011.pdf**
- **These slides: GerryStahl.net/pub/cscl2011.ppt.pdf**

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