Project 2

How is high-level cognition achieved?
Clark’s Equation

- High-level cognition = low-level processes + Wideware
High-level cognition?

- Choose and activity that involves high-level cognition - the sort of thing that cannot be done by low-level (perceptual/motor) processes alone.
- How do you know you have such an activity? Check with Clark and with Kirsh.
Reasoning about that which is absent

- Planning for the future
- Understanding the behaviors of others
- Inferring stuff that can not be observed directly.
Reasoning about abstractions

- Abstract refers to properties of objects and events that cannot be directly perceived. (separated from matter, practice, or particular examples)
- Chimps with tokens representing “same” and “different”
A first-order abstraction
A second-order abstraction
Words as Wideware

- Words are external patterns that can be perceived and produced
- Associating words with concepts (which are perceived, or constructed from perception)
- The perception and production of words can be imagined
- The “language of thought” is derivative from public language
- This makes spiraling meta-cognition possible
Place-value arithmetic as an activity loop

1. Create patterns of symbols in the world by writing.
2. Examine the written patterns.
3. Recognize patterns that are associated with rules for more writing.
4. Write more symbols.
5. Go to 2.
That’s real symbol processing

• Is it the only kind we do?
• Well, we can also imagine the symbols, and imagine writing and inspecting them.
• So we could have an internal simulation of the interaction of internal/external.
The cultural symbol system hypothesis (CSSH)

- Symbols are external first, and only (sometimes) later represented internally.
- Cultural symbol systems provide important kinds of Wideware.
- We are natural born cyborgs
Low-level processes
Wideware

- Cultural patterns, conventions
- Material Artifacts
- Practices
- Non-material artifacts, rules of thumb, strategies.
- In general, any functional ability that was not built into your brain at birth or that did not arise as a product of maturation. Not the “naked” brain.
How are the body and the world involved?

• In accomplishing the high-level cognitive task, examine what your body does and how it engages the physical/cultural environment.

• Day dreaming is a high-level activity, but not a good choice for this assignment.
Follow the representations

• What is represented? Where? When? In which media? In what form?
• Look for both external and internal representations.
• Transformation, transduction, and coordination of internal with external representations will involve low-level (perceptual and motor) processes.
Could it have been otherwise?

- When you look at the world with which you interact, try to imagine how the interaction would be different if the world were organized differently.
- What if your body or your senses were different? Suppose you had four arms or three eyes, or a sixth sense.
- This will help you see how perception and action are involved in the high-level process.
Clark’s Equation

• High-level cognition = low-level processes + Wideware

• Substitute real events and objects for the variables in this equation.

• Reflect on how it comes out.