Bartlett's View of the Group as a Psychological Unit

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AAAI Fall Symposium on Knowledge and Action at Social and Organizational Levels, Asilomar, CA, AAAI Press, 20-22, 1991.

Frederic C. Bartlett pioneered studies relating individual and group behavior. His memory experiments in particular suggest that cognition is, in his terms, a "socially constructive" process (1932, pps. 274-280):

- ❒ coordination functions in activity, not in the individual mind;
- ❒ contributions that stand must be part of a group trend;
- ❒ an individual acquires greater influence in a complex community;
- ❒ swift insight changes the group, but details in working out ideas emerge, dependent on the "form and trend of the group before the achievement is effected";
- ❒ design rationale for artifacts emerges from practice (rather than being exclusively generative of the device);
- ❒ modifications to an instrument develop in practice (and so cannot be attributed exclusively to an individual or a linear aggregation of individual contributions).

Bartlett draws a strong parallel between social development and an individual's design activity. First, an artist isn't merely executing a preconception, but necessarily improvises, reperceiving the ongoing trend of his drawing, interpreting its force and meaning, and incrementally adding or reshaping what is there. "Having started his design, the rest of the figure must fall into a certain harmony of outline and balance of parts which, of course, limit individual choice." That is, the artist's own drawing action is constrained by the trends he has himself produced. Not just any contribution will do. Furthermore, the characteristics of the drawing are themselves a realization of cultural practices, values, and activities. Understanding social practice as development within trends necessarily involves understanding development of the individual in a social environment.

But Bartlett leaves open the "exact relation to individual effort" of social constructiveness. He suggests that the process of assimilation, simplification, attention to odd details, and creation of characteristic complexes reflects mental processes of individuals. Obviously, every statement in a conversation or line in a drawing is somehow constrained by neural processes (or I could travel to a foreign country and immediately speak the language). But also, sense-making and comprehension is something each individual must accomplish as he or she interacts within a group. Building on Bartlett's model of remembering, I have developed a notation that represents the dialectic process of coordinating perception and action in the individual. The key ideas are that human memory is not a place where representations are stored, and categories are not things, but always new ways of coordinating perception and action, generalized and composed in the process of activity itself.

Papers by W.J. Clancey (1988-1991)

The frame of reference problem in the design of intelligent machines. In K. vanLehn (Ed.), *Architectures for Intelligence*, Hillsdale, NJ: Lawrence Erlbaum Associates, 1991. Schema-based cognitive models describe historical patterns of interaction between neural and environmental/social processes, from an observer's perspective, not the mechanisms in the brain.

Model construction operators. To appear in *Artificial Intelligence*. AI programming can be viewed as methods for modeling systems qualitatively, not restricted in application to the modeling of reasoning.

Why today's computers don't learn the way people do. In P.A.Flach and R.A. Meersman (Editors), *Future Directions in Artificial Intelligence*, Amsterdam: North-Holland, 1991, pps. 53-62. Speaking is conceiving.

Review of Rosenfield's *The Invention of Memory*. *Artificial Intelligence*. **50**:241-284, 1991. Evidence collected by Bartlett, Collingwood, James, Bransford, Jenkins, and Sacks argues against the memory-as-stored-structures hypothesis, the keystone of expert systems and cognitive modeling research.

Situated cognition: How representations are created and given meaning. Co-authored by Jeremy Roschelle. To appear in a special issue of *The Educational Psychologist*. Representations are created by an *interaction* of neural and external processes in what we call perception; they are interpreted interactively, in cycles of perceiving and acting; they are the *product* of interactions, not a fixed substrate from which behavior is generated.

Interactive control structures: Evidence for a compositional neural architecture. Chapter for book in preparation. The coordination of perception and action can be viewed in terms of constantly composing experiential details (perceptions, memories, and ideas) into a story about "what am I doing now?"

A Boy Scout, Toto, and a Bird: How situated cognition is different from situated robotics. NATO Workshop on *Emergence, Situatedness, Subsumption, and Symbol Grounding.* Situated robots are hybrid systems, still based on the idea of stored structures, which should be viewed as improved models, not the new mechanisms required by situated cognition.

Practice **cannot be reduced to theory: Understanding social science perspectives on software design.** Tutorial slides, includes summary of papers in Greenbaum & Kyng. Christopher Alexander's "pattern language" may provide the missing link between practice and generalized designs for social-technological systems.

Important Recent Influences

Alexander, C., et al. 1977. *A Pattern Language.* New York: Oxford University Press.

Bamberger, J. 1991. *The mind behind the musical ear.* Cambridge, MA: Harvard University Press.

Bamberger, J. and Schön, D.A. 1983. Learning as reflective conversation with materials. *Art Education*, March.

Bartlett, F. C. [1932] 1977. *Remembering--A Study in Experimental and Social Psychology.* Cambridge: Cambridge University Press.

Bateson, G.1988. *Mind and Nature: A necessary unity.* New York: Bantam.

Bickhard, M.H. and Richie, D.M. 1983. *On the Nature of Representation: A Case Study of James Gibson's Theory of Perception.* New York: Praeger.

Greenbaum J. and Kyng, M. 1991. *Design at Work: Cooperative design of computer systems*. Hillsdale, NJ: Lawrence Erlbaum Associates.

Gregory, B. 1988. *Inventing Reality: Physics as Language.* New York: John Wiley & Sons, Inc.

Iran-Nejad, A. 1987. The schema: A long-term memory structure or a transient functional pattern. In R. J. Tierney, Anders, P.L., and J.N. Mitchell (editors), *Understanding Readers' Understanding: Theory and Practice,* (Hillsdale NJ, Lawrence Erlbaum Associates)

Lave, J. 1988. *Cognition in Practice.* Cambridge: Cambridge University Press.

Maturana, H. R. 1983. What is it to see? *¿Qué es ver?* 16:255-269. Printed in Chile.

Sacks, O. 1987. *The Man Who Mistook His Wife for a Hat.* New York: Harper & Row.

Schön, D.A. 1979. Generative metaphor: A perspective on problem-setting in social policy. In A. Ortony (Ed), *Metaphor and Thought.* Cambridge: Cambridge University Press. 254-283.

Schön, D.A. 1987. *Educating the Reflective Practitioner.* San Francisco: Jossey-Bass Publishers.

Tyler, S. 1978. *The Said and the Unsaid: Mind, Meaning, and Culture.* New York: Academic Press.

Wenger, E. 1990. *Toward a theory of cultural transparency: Elements of a social discourse of the visible and the invisible.* PhD Dissertation in Information and Computer Science, University of California, Irvine.

Open Questions

1. "Every thought is a generalization" (Vygotsky). What processes internal to the individual constrain behavior change? Skill development is not simply routinizing, adapting, becoming more efficient and automatic. Not just practicing. Not just being awake and *doing*.

Rather, I am actively gathering cues, becoming more reactive, responsive, tuned, focused, quick (and able to take on more duties, tasks, concerns)—an intensely *personal* project that coherently *composes* ways of seeing, attitudes, and movements. Social theory alone cannot explain how that happens.

We need to model the *roles of reflection* (Schön): Framing -> history-telling -> design (the inquiry project). For example, consider the orientation of war stories: What did we do? What do you remember about our path? What does this mean to *me?* (Why do I feel the need to tell a story? How do stories change my behavior?) In our theory, rationalization must be re-related to personal identity and social action.

We need to relate ethnographic views of data, context, and interaction to the level of individual perception, sense-making, and the mechanism of regularity or habit formation. We need a neural/perceptual theory to explain how how strategic and reflective talk reorients individual behavior.

The social view of this is behavioral or silent. Lave's extreme view--no transfer, you must be in the same situation--is obviously incomplete. The situation is never the same. All behavior is a generalization of the past (Edelman, "The Remembered Present"). What transfers are ways of seeing, talking (framing), that is, *ways of being involved*, *ways of coordinating*, *ways of relating.*

Context isn't physical/social, i.e., an external world alone. Context is a *transactional construction*, realized for the individual as mental processes (interacting with the environment) that bias perception and hence ongoing behavior. Analyses of learning transfer must be reformulated to include neural-psychological processes behind habit formation and reflection.

2. Personal perceptual experiences: You can imagine being there by projecting, envisioning. We can deliberately create private representations (exclusively in the head). We can place ourselves in a state of mind, for example, to imagine a conversation and project alternative interactions. We can reflect on these and choose. What are the dynamics between these experiences and other actions in a group?

Are perceptual processes when working alone qualitatively different from being in a group, e.g., are possibilities for breakdown more common and fruitful in group interactions? Does perception of others' understanding constitute a special kind or level of reflection? How does individual experience at the moment provide resources for and constrain the group's interaction? How can we tease apart the individual's work to construct continuity with other contributions that confirm and tear apart this sense? What happens when individual ways of seeing preserve individual coherence, at the expense of not perceiving contributions from others as new?

3. The social view is humane, but impersonal. Social theory gives no explanation of how moral behavior is possible, especially in the face of community pressure. What permits the freedom to choose? What constrains it? What promotes thinking ahead, taking responsibility, and deciding what to do? Indeed, what leads an individual to plan, to change the embedding community that works against this very change? Social theory without personal cognition is rudderless, without a coherent core. What drives social harmony is personal commitment, care, contribution, ownership. The wholly social view has no character, no spunk, no daring. A land without heroes or clowns.

What are the social reasons for *non-innovative* thinking?

What is the role of integrity and courage? What is the nature of humor, the source of pride?

What explains the joy of fantasy, curiosity, boredom, playfulness, tension, stress, anxiety, poetry?

How do social pressures twist, inhibit, and destroy the individual?

Every community *constantly works against* change, innovation, creativity, and learning. The dilemma a creative individual faces is as strong as social shaping and structuring. To promote innovative thinking is to promote social change. How does a progressive society support individual initiative without producing anarchy? Describing learning as becoming a member of a community of practice must include why the individual joins a particular group and how the group must change to accommodate the developing complexity of individual points of view.