

U-Shaped Changes Are in the Eye of the Beholder

Susan Goldin-Meadow
Department of Psychology
University of Chicago

A classic case of U-shaped development is the child who has been correctly saying "went" and all of a sudden starts saying "goed"—an apparent regression which upsets parents and excites researchers. It's a striking phenomenon in part because the change in the child's behavior is not likely to be a product of feedback from an adult—"went" is the correct form in English and is therefore not likely to elicit special notice from English-speaking adults. Eventually "goed" drops out of the child's repertoire and "went" reasserts itself. Like all U-shaped phenomena, "goed" is only an apparent regression. In fact, what's happening is that the child discovers a pattern (that "-ed" is the predominant ending for past in English) and generalizes that pattern more broadly than is appropriate (to irregular verbs like "go" that don't take the pattern). The assumption is that when "went" returns to the child's repertoire, it has a different status in that repertoire. Moreover, the fact that "went" goes in and out of the child's repertoire has implications for regular verbs like "played" which do not change their form throughout this period. At the beginning of the U, "played" is an unanalyzed form; at the end of the U, it has parts—"play" and "ed."

This developmental picture parallels the trajectory Namy, Campbell, and Tomasello (this issue) describe for comprehension of iconic gestures. The *visible* change is in arbitrary gestures—they are associated with referents early on, then go through a period during which they are no longer easily linked to a referent, only to return to the original, easily linked status in the third stage. The *invisible* change occurs in iconic gestures. Iconic gestures are easily associated with referents throughout the period. But just as the word "played" undergoes reorganization even though it doesn't change in form, so too with iconic gestures. Early on, iconic

gestures are linked to referents in an arbitrary way—hence the similarity between iconic and arbitrary gestures. Later, children discover the iconic possibilities of gesture and briefly lose the ability to make arbitrary mappings.

U-shaped phenomena are valuable because they direct our attention to places where reorganization might be taking place. The early-produced “went” is not the same as the later-produced “went”—it’s generated by a different system. The trick, of course, is figuring out what’s not the same about the early occurrence and the later occurrence. As Gershkoff-Stowe and Thelen (this issue) point out, one good approach to this problem is to characterize the phenomenon at another level, for example, to describe more carefully the contexts that elicit the stepping reflex when it first appears versus when it later resurfaces.

When a behavior disappears and then resurfaces, developmental psychologists typically look more closely at the behavior to figure out what’s different before and after—that is, they *increase* the grain with an eye toward discovering how the system that generates that behavior has changed. But what ought to count as a U-shaped phenomenon? How similar does the reappearing behavior have to be to the initial behavior to call it a U-shaped trajectory? If we *decrease* the grain, blurring differences between an early and a late behavior, more developmental trajectories might turn out to have a U-shaped form. More importantly, these U’s might also provide pointers to possible reorganizations.

Take, for example, the gestures that accompany speech. Early in the acquisition of liquid conservation (time 1), children tend to convey the same information in gesture and speech when they explain their solutions to the task. A child might produce a “pour” gesture mimicking the trajectory of the liquid from the glass to the dish as he or she says “it’s different because you poured it.” Later (time 2) the child might give precisely the same explanation in speech but produce a slightly different gesture—producing the “pour” motion from the *dish* to the *glass*, as though reversing the original pouring action. Finally (time 3), the child once again returns to conveying the same information in gesture and in speech—the reversed “pour” gesture with a new spoken explanation “you could pour it back and then it would be the same.”

This is not a U-shaped phenomenon on one level—the gestures don’t look precisely the same at time 1 and time 3, nor does the speech sound the same. But on another level, it is—at both time 1 and time 3, the gestures that the child produces convey the same conservation rationale that’s conveyed in the child’s speech (see Alibali & Goldin-Meadow, 1993). If you squint, you can see similarities in the early and late behaviors. Moreover, those similarities turn out to reveal stable developmental states (the states that in Gershkoff-Stowe and Thelen’s terms are “attractive” and not easily perturbed). Children who produce gesture-speech “matches” on a task are relatively unaffected by instruction in that task. In contrast, children who produce gesture-speech “mismatches” are relatively unstable and thus are ready to profit from instruction (Church & Goldin-Meadow, 1986;

Goldin-Meadow, 2003; Goldin-Meadow, Alibali, & Church, 1993; Perry, Church, & Goldin-Meadow, 1988). The "loss" of the matching state during time 2 can be seen as a regression or, more profitably, as a transitional period when reorganization is likely.

The three articles in this volume emphasize that the initial and end points of a U are never really identical. The question is—how identical need they be for us to call the developmental trajectory U-shaped? The virtue in thinking about a developmental path in U-shaped terms is that we focus our attention on possible reorganizations and mechanisms of change. Recurrence, regression, and U's are to a large extent a product of the level at which we choose to describe developmental change. They are, in this sense, in the eye of the beholder and may be more common than we think.

REFERENCES

- Alibali, M. W., & Goldin-Meadow, S. (1993). Gesture-speech mismatch and mechanisms of learning: What the hands reveal about a child's state of mind. *Cognitive Psychology*, 25, 468–523.
- Church, R. B., & Goldin-Meadow, S. (1986). The mismatch between gesture and speech as an index of transitional knowledge. *Cognition*, 23, 43–71.
- Goldin-Meadow, S. (2003). *Hearing gesture: How our hands help us think*. Cambridge, MA: Harvard University Press.
- Goldin-Meadow, S., Alibali, M. W., & Church, R. B. (1993). Transitions in concept acquisition: Using the hand to read the mind. *Psychological Review*, 100(2), 279–297.
- Perry, M., Church, R.B., & Goldin-Meadow, S. (1988). Transitional knowledge in the acquisition of concepts. *Cognitive Development*, 3, 359–400.

Copyright of Journal of Cognition & Development is the property of Lawrence Erlbaum Associates and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.