

# What's Happening? The Structure of Event Perception

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The world as we experience it is a continuous flow of activity, yet we talk about it in terms of discrete events, generally linked by a hierarchical structure. Is this just a side-affect of the way our language works, or does it reflect something deep about the cognitive architecture? The present research is aimed at extending our knowledge about the structure of event perception by examining the perceptions of people while they watch everyday activities being performed by another person.

A number of studies of memory for texts and video sequences have demonstrated hierarchical encoding effects (e.g. Bower, Black & Turner, 1979; Abbott, Black & Smith, 1985; Brewer & Dupree, 1983; Lichtenstein & Brewer, 1980). There is also weak evidence for hierarchical structure in online event segmentation (Newton, 1976, but see Cohen & Ebbesen, 1979). The primary aim of this study was to give a strong test for the presence of hierarchical structure in event perception. Also, we predicted that this structure would be more evident for familiar activities than for unfamiliar ones, reflecting greater influence of event schemas or scripts (Schank & Abelson, 1977) on perception.

Based on a set of previously collected norms, we selected two activities that were high in familiarity ("making the bed," "doing the dishes"), and two that were low in familiarity ("assembling a saxophone," "fertilizing houseplants"). For each of the four activities, we constructed a script consisting of twelve discrete steps. Two actors (one male, one female) performed each of the activities in accordance with the script. In a procedure based on Newton's (1973), participants were instructed to tap a key whenever a unit in the activity ended and another began, and then to say what had just happened. Half the participants were instructed to "mark off the behavior of the person you'll be seeing into the smallest units that seem natural and meaningful to you." The other half were instructed to use the largest units that seemed natural and meaningful. We will refer to these as "fine" and "coarse" coding conditions. Subjects viewed all four activities (2 performed by one actor, 2 by the other) in a given coding condition, and then repeated the coding in the other condition after a short delay. 32 Stanford undergraduates took part.

To assess the presence of hierarchical structure in viewers' event perception, we analyzed the data using two strategies. The first involved dividing the tapes into discrete bins of time, and then asking in which bins a given participant had tapped. The measure of hierarchical structure was the extent to which bins in which there were taps in the coarse and fine conditions coincided, relative to chance. The second strategy involved direct comparisons of the times of the individual taps. The measure of hierarchical structure was the extent to

which breakpoints in the coarse condition were closer to breakpoints in the fine condition than predicted by chance.

By both measures, there was clear evidence for hierarchical structure. Coarse and fine breakpoints, when discretized into 1-second bins, overlapped more than predicted by chance (2.50 overlaps per subject per tape, compared to 1.92 predicted by chance),  $t(112) = 5.10$ ,  $p < .001$ . Coarse breakpoints were on average closer to the nearest fine breakpoint (2461 ms) than predicted by chance (5330 ms),  $t(112) = 7.87$ ,  $p < .001$ .

Familiarity had no effect on overall rate of tapping ( $F(1,343) = .169$ ,  $p = .681$ ), but it did increase the magnitude of hierarchical structure as measured by the continuous analysis,  $F(1,1068) = 4.27$ ,  $p = .04$ . (A second analysis, based on the discrete method, revealed a similar trend that approach significance,  $F(1,111) = 3.64$ ,  $p = .059$ .)

The data support two conclusions about how events are structured in perception. First, they indicate that people spontaneously build up hierarchical representations of events during perception. Second, this hierarchy was more reliably present for activities that were familiar than for unfamiliar activities. Hierarchical structure does not by itself imply the influence of scripts or goal structures on the perception of events (Newton, Hairfield, Bloomingdale & Cutino, 1987). However, the effects of familiarity on the strength of the hierarchy do support the notion that pre-existing schemas influence the perception of structure in events.

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