# Representation of Intentions in Routine Skills

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Intentions can be represented theoretically as active, structured states of working memory. This approach is complementary to standard componential and capacity approaches to understanding executive control. We report the results of several studies examining hypotheses derived from this view of intentions.

Carlson (1997, 2002) described intentions as mental states that instantiate goals and have a schematic structure that specifies desired outcomes, operations for achieving those outcomes, and mental or physical operands. This structure is dynamic, such that instantiating a goal to apply a specific operator evokes a procedural frame to which operands can be assimilated. Instantiation as an intention is one phase of an intention-outcome cycle in which goals are first represented prospectively (Figure 1). In a complex activity, this intention-outcome cycle is embedded in a plan that represents a larger goal structure.

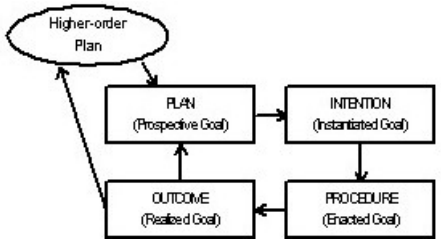


Figure 1: The intention-outcome cycle

Applying this analysis to routine skills with repetitive sequential structures (e.g., counting, running arithmetic) provides a basis for examining several specific hypotheses. The *deictic specification* hypothesis suggests that fluent performance is achieved in part by streamlining intention representations such that their elements are specified deictically rather than semantically, and error monitoring is implicit rather than explicit. The *temporal tuning* hypothesis suggests that instantiating a goal as an intention serves to establish a temporal frame of reference that can be used to coordinate cognitive processing with the perceptual pickup of information.

## Deictic Specification

Carlson and Cassenti (in press) examined the deictic specification hypothesis in an event-counting paradigm. Participants counted visual events in a variety of timing conditions. We found support for a model in which events are specified by when they appear rather than by their identity, when temporal regularity makes that possible. This deictic specification allows intention-outcome confusions and promotes implicit error monitoring. Only disruptions to the flow of events (e.g., non-rhythmic trials) seem to trigger error detection, leaving errors in rhythmic trials largely undetected.

## Temporal Tuning

Carlson and Stevenson (2002; Stevenson & Carlson, in preparation) examined the temporal tuning hypothesis in a running arithmetic paradigm. We found that preview of at least one upcoming operator seems to be necessary for participants to establish a temporal reference frame. This reference frame is adjusted to the structure of the task, and allows individuals to learn to coordinate self-paced displays with ongoing mental operations. Neither declarative nor procedural knowledge of upcoming operators appear to substitute for preview. Temporal tuning thus depend on environmental support for the specification of operators.

## Conclusions

Analyzing intentions as active, structured states of working memory suggests new hypotheses about the control of routine activities. The experimental results reported here support several of these hypotheses, and suggest boundary conditions for them. Other results support hypotheses concerned with information-acquisition strategies and the coordination of information in working memory and in the environment. The present analysis can be related to recent work on the computational modeling of executive control.

## References

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