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# Motivational Strength of Goals and Cognitive Strength of Goal Representations

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## Motivational and Cognitive Strength

Human actions are analyzed by psychological theories on different levels of abstraction. On the one hand *action theoretical approaches* in social psychology and psychology of motivation (e.g., the theory of action phases, Gollwitzer, 1990) focus on motivational and volitional processes, i.e., on the choice between potential goals with different motivational strengths, the formation of action-guiding intentions and the selection of intentions for execution according to their volitional strengths. Theoretical descriptions of this kind are located on the rational or intentional level of analysis (Anderson, 1990). On the other hand *information processing approaches* such as the ACT theory (Anderson, 1983) use a lower level of description. In these theories human actions are analyzed in terms of production rules and activation spreading between network nodes. This level of description is called the representation and algorithm level, or the functional level (Anderson, 1990). We suppose that functional level theories explain how intentional processes are realized by lower level mechanisms. In this study we investigate how the motivational strength of potential action goals might be realized within an information processing system.

In the ACT theory, action-guiding intentions can be represented by a specific type of declarative memory units (*goal units*). The volitional strength of intentions can be mapped onto activation values of the goal units representing these intentions (cf. Norman & Shallice, 1986). Potential action goals that have no intentional status should be represented by ordinary declarative memory units, not goal units. It is our hypothesis that the motivational strength of these possible goals can be mapped onto the cognitive strength of the goal representations. Cognitive strength determines how easy a declarative unit can be activated for working memory access or pattern matching. The hypothesized correspondence between motivational and cognitive strength allows for the explanation of some motivational effects on the cognitive level. To empirically test our hypothesis we manipulated the motivational strength of potential action goals and measured the effects of this variation on the cognitive strength of the goal representations.

## Method

Participants ( $N = 28$ ) were told that after some preliminary information they would be assigned one out of four possible tasks (with artificial names). The information consisted of

motivationally irrelevant facts about the task. All task descriptions were presented as single sentences on a computer screen. Following these descriptions, motivationally relevant information was given: Two of the tasks were associated with a high monetary incentive for good performance, the other two with a low incentive. None of the potential goals should have intentional status because subjects were not allowed to choose one of the tasks. To avoid selective rehearsal of task information, subjects had to perform a calculation task immediately after receiving the motivational information. To measure the cognitive strength of the goal representations we used recognition latencies for goal-related facts (cf. Anderson, 1983, pp. 174 - 175). The recognition task comprised 12 originally presented sentences (*targets*), 12 completely new sentences (*non-overlap foils*) and 12 sentences describing facts which were originally combined with a different goal (*overlap foils*).

## Results and Discussion

Mean recognition time for goal related information was 3223 ms ( $s = 851$ ) for goals with low motivational strength and 3003 ms ( $s = 612$ ) for goals with high motivational strength. No differences in the percentage of errors (about 20%) were found. A two-factorial repeated measurement MANOVA comparing recognition latencies for the two motivational conditions (low, high) and the three item-types (targets, non-overlap foils, overlap foils) shows significant effects of both motivational strength ( $F(1,27) = 7.86$ ;  $p = .009$ ) and item type ( $F(2,26) = 28.1$ ;  $p < .001$ ) but no significant interaction. Our results support the hypothesis that motivational strength of potential action goals is (at least partially) realized by the cognitive strength of declarative goal representations.

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